The earlier Palaeolithic of Syria: settlement history, technology and landscape-use in the Orontes and Euphrates Valleys

Shaw, Andrew Douglas

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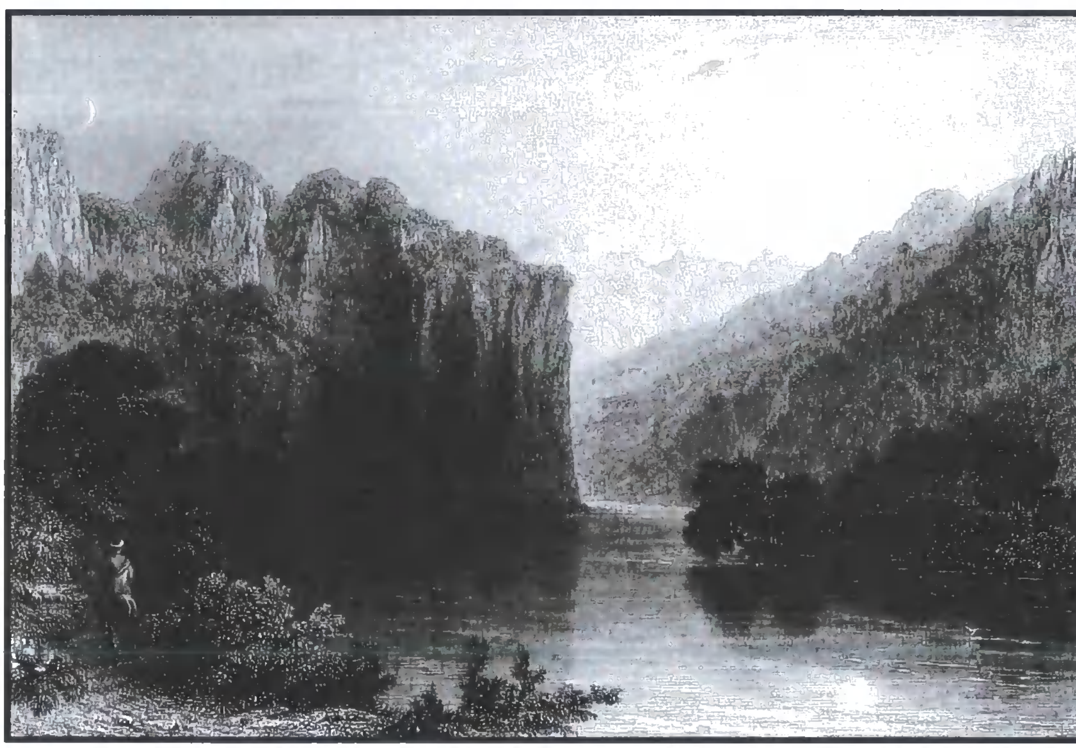

Andrew Douglas Shaw

Department of Archaeology

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Abstract

This thesis represents the first investigation to examine Lower and Middle Palaeolithic technological behaviour in Syria in its wider landscape context, focussing on material from the two main river valleys; the Orontes and the Euphrates. Recent geological work has begun to develop an increasingly secure dating scheme for the terraces of these rivers, and hence for the artefacts obtained from them. Key artefact collections which can be located within these emergent chronostratigraphic frameworks were delimited. These assemblages have been analysed using a dynamic and flexible methodology which enabled the specific factors which affect artefact variability (in terms of local material affordances and human choice) to be assessed. Lithic artefacts are treated as the residues of hominin action, and not, as has frequently been the case, the static markers of chrono-cultural evolution.

This research has demonstrated that Lower and Middle Palaeolithic hominins responded knowledgably and flexibly to the specific material constraints of particular places at particular points in time. Moreover, it emphasises that understanding particular assemblages entails relocating this material within its landscape context - effectively, looking from lithic artefacts and scatters to reconstructing early human lifeways. Significant outcomes of this research include the identification of the earliest evidence for a hominin presence in Syria (~1 mya), the technological repertoires associated with these populations, the nature of, and the factors responsible for, Lower and Middle Palaeolithic technological variability, and the behaviours associated with Lower and Middle Palaeolithic hominins. The results of the research have wide-ranging and profound implications for understanding the earlier Palaeolithic record of Syria and the wider Near East. In particular, it demonstrates that many fundamental assumptions regarding the nature and meaning of technological and behavioural variability in the Near East require re-assessing.

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Declaration

None of the material contained in this thesis has previously been submitted for a degree at the University of Durham, or at any other university.

Statement of Copyright

Chapter 1

Introduction

1.1 Investigating the earlier Palaeolithic in Syria

In 1930 the German archaeologist Alfred Rust initiated several seasons of excavation at rockshelters near the village of Yabrud, north of Damascus. Thus began the first systematic investigation of earlier Palaeolithic deposits in Syria. Since this time, the period has continued to attract the interest of scholars, albeit in small numbers. Indeed, most investigations of the Palaeolithic in the region were undertaken by only a handful of dedicated researchers (in particular W. J. Van Liere, F. Hours, L. Copeland, J. Besançon, P. Sanlaville, S, Muhesen, T. Akazawa, J. -M. Le Tensorer and E. Boëda). As a result of their efforts, Syria has been shown to possess an enviable record of early human occupation. However, due to the pioneering nature of most research into the earlier Palaeolithic, efforts have been directed towards documenting chrono-cultural changes in material culture (in particular typological and technological variability in stone tool assemblages) in order to gain a general overview of settlement history (e.g. Copeland and Hours 1993, Le Tensorer *et al.* 2001, Copeland 2004). Consequently, we actually know relatively little about the specific behaviours of early humans in this important region.

Investigations into the earlier Palaeolithic record of Africa and Eurasia have reached something of a watershed. Researchers are becoming increasingly aware that the historical preoccupation with producing chrono-cultural sequences based on lithic artefact variability is limiting when seeking to reconstruct hominin behaviour (see papers in Gamble and Porr 2005, and Hovers and Kuhn 2006). Indeed, such approaches may even fail to fully account for the technological variability apparent in the archaeological record. Frameworks which treat the archaeological record as static – over long periods of time and large geographic expanses – are viewed as increasingly constraining. In the earlier Palaeolithic, as in all archaeological endeavours, the material residues within which our studies are grounded are only explicable in terms of the very human behaviours which they can illuminate.

Human behaviour, whether modern or archaic, is never static, but rather it is both dynamic and flexible. Assessing the behavioural implications of the earlier Palaeolithic archaeological record requires interpretative methodologies which reflect this fact. Since human behaviour does vary at all scales of analysis, it is essential that archaeological assemblages are not divorced from their temporal *and* spatial context. Earlier Palaeolithic hominins lived within, moved through, and perceived their landscapes in a myriad different ways (*cf.* Conneller

2007). It is therefore essential that a contextual approach is adopted, within which scatters of artefacts are considered in relation to the wider landscape. Approaches to studying the Palaeolithic record are increasingly self-conscious in their consideration of places and the actions which were undertaken at them (e.g. Pope and Roberts 2005, De Loecker 2006, Meignen *et al.* 2006, Scott 2006). Such studies have clearly demonstrated the immense potential of careful, situationally-informed investigations for understanding the earlier Palaeolithic archaeological record. This research embraces and has been informed by these principles, adapting and applying them to Syrian assemblages. The comparative richness of the Syrian record is, of itself, a testament to the efforts of previous researchers, and provides abundant evidence of early human occupation which can be used to advance our understanding of hominin adaptation, behaviour and settlement history in the region, as well as further afield.

1.2 The importance of the Orontes and Euphrates Valleys within the earlier Palaeolithic of Syria and the Near East

This research is concerned with understanding the behaviours and landuse practices associated with earlier Palaeolithic hominins in Syria, through the analysis of key archaeological assemblages from two important regions; the Orontes and Euphrates Valleys. Research has focussed on these areas because both possess some of the most significant artefact collections from Syria, or indeed, the wider Near East. Fluvial archives - such as those represented by the terrace staircases of the Orontes and Euphrates - are major repositories for earlier Palaeolithic material, and have historically been a primary research resource. The relative abundance of lithic material from these regions allows an informed selection to be made of those most likely to provide insights into earlier human behaviour and landscape-use.

Previous research in the Orontes and Euphrates Valleys has produced a series of typo-technologically distinct earlier Palaeolithic archaeological assemblages (Copeland and Hours 1993, Copeland 2004), upon which are grounded traditional chrono-cultural interpretations of artefact variability in Syria and the wider Near East (Gilead 1970, Hours 1981, Copeland and Hours 1993, Bar-Yosef 1994; 1998, Copeland 2004). These assemblages therefore provide an ideal dataset for re-assessing the validity of these interpretations. Moreover, broad age-ranges can also be assigned to collections from the Orontes and Euphrates Valleys, on the basis on their typo-technological characteristics, associated biostratigaphic data, or through correlation with chronometrically dated deposits. As a consequence, it is possible to use these assemblages to assess whether there are any chronological changes in technological decision making and landuse practices in these regions. Although all of these assemblages are from river valleys, the fact that the Orontes and Euphrates are located in geographically and geologically distinct areas of Syria also allows contrasts to be drawn between broadly contemporary assemblages in both regions. Most importantly, however, earlier Palaeolithic assemblages from the Orontes and Euphrates Valleys are from places that are accurately located, geologically characterised and chrono-stratigraphically ordered. Consequently, they are ideally suited to a contextualised approach to the study of early human material culture. By acknowledging that lithic technology is intimately linked to wider hominin behaviours, it is possible to interrogate collections using theoretical perspectives and methodological techniques which allow a more dynamic picture of technological variability. This allows us to see beyond assumed chrono-cultural and technological evolution, and to investigate active hominin choices and behaviours. The implications of this work potentially extend far beyond the confines of the Orontes and Euphrates Valley and arguably has profound implications for understanding the earlier Palaeolithic record of the entire Near East.

1.3 Aims and objectives

This study focuses on lithic assemblages from the Orontes and Euphrates Valleys as they are the only material residues of earlier hominin behaviour from this region. Although by no means representative of all aspects of earlier Palaeolithic human behaviour, they clearly have great potential for illustrating aspects of hominin technological decision making and landscape-use. The aims and objectives of this study are fourfold:

- To assess the context and technological variability of key earlier Palaeolithic assemblages from the study regions.

- To attempt to interpret this variability in terms of specific technological practices within the landscape settings or catchments surrounding the sites.

- To reconstruct patterns of hominin technological decision making and landscape-use in the study areas during the earlier Palaeolithic, and to assess what temporal or spatial patterns are apparent.

- To relate these patterns to hominin behaviour during the earlier Palaeolithic of the Near East as a whole.

1.4 Outline of research

This chapter has outlined the key objectives of this thesis and the importance of this research to advancing our understanding of the earlier Palaeolithic of Syria and the wider Near East. Subsequent chapters will address these objectives.

Chapter two places this research within its historical context. It also seeks to illustrate how and why previous interpretations of the earlier Palaeolithic record of Syria were proposed, and to explain how the period is currently understood. In particular, it discusses frameworks previously advanced to investigate earlier Palaeolithic artefact variability in Syria and how these have both increased and limited our knowledge of the period. The origins and nature of the methodology adopted in this thesis are then summarised, and the specific questions which this approach is designed to address are outlined.

On the basis of the analytical framework outlined in chapter two, chapter three presents the methodology used to investigate the lithic assemblages analysed in this thesis. It explains that the selected assemblages have been divided into two broad chronologically distinct categories ("Lower Palaeolithic" and "Middle Palaeolithic") and outlines the logic underlying this. In addition, the criteria used to delimit the assemblages selected for detailed analysis are discussed.

Chapters four to nine present detailed analysis and interpretation of the selected assemblages. Chapters four, five and six deal with those from the Orontes Valley. Chapter four provides background information on the specific history of earlier Palaeolithic investigation in this region and outlines the chronostratigraphic frameworks within in which these have been carried out. Chapter five presents the Lower Palaeolithic assemblages studied from the Orontes, whilst chapter six contains the Middle Palaeolithic collections. In chapters five and six the assemblages are presented in broad chronological order (oldest to youngest). Each is discussed in terms of its historical, geographical and (when possible) environmental context. Age estimates are then discussed, before the presentation of detailed taphonomic and technological analysis. On this basis, an interpretation is offered of the technological and landscape-use practices associated with each collection. These are then drawn together at the end of each chapter to provide an overview of Lower and Middle Palaeolithic hominin behaviour in the Orontes Valley as a whole. The subsequent three chapters - seven, eight and nine - present the assemblages studied from the Euphrates Valley. This follows the same format as used in the discussion of the Orontes material; chapter seven deals with the history of earlier Palaeolithic investigations in the Euphrates Valley and the chronostratigraphic frameworks associated with the Pleistocene archaeology from this region, whilst chapters eight and nine discuss the Lower and Middle Palaeolithic assemblages analysed.

Chapter ten discusses the implications of this study and how these affect our understanding of the earlier Palaeolithic record, both in Syria and the wider Near East. Specific issues discussed include the earliest evidence for a hominin presence in the region, the technological repertoires associated with these populations, the nature of, and the factors responsible for, Lower and Middle Palaeolithic technological variability; the behaviours associated with Lower and Middle Palaeolithic hominins, Levallois origins and Levallois variability.

Finally, chapter 11 presents the overall conclusions of this study. It includes a discussion of potential future directions for research based on the interpretations advanced here.

Chapter 2

Historical Background; Previous and Current Research Frameworks

2.1 Introduction

Archaeological research rarely, if ever, occurs in an intellectual vacuum, being as it is a product of historical contingencies, current and past research paradigms, and an individual's personal research background. Consequently, an important aspect of any study is the historical context within which research is carried out and the frameworks that it encompasses. This chapter therefore seeks to explain the historical context and research trajectories which have forged this thesis. Specifically, the nature of previous research into the earlier Palaeolithic record of Syria, the intellectual paradigms which have directed the approaches taken by past researchers and the main influences on the approach advocated in this study are examined. In this context it is important to recognize that consideration of these issues extends beyond the modern geopolitical boundaries of Syria; historically, earlier Palaeolithic research in this country has followed research trajectories that span much of the Near East with roots often to be found in European and African contexts.

2.2 Investigating earlier Palaeolithic archaeology in Syria

Previous research into the earlier Palaeolithic archaeological record of Syria has demonstrated both its richness and its potential for increasing our understanding of early human societies. Notably, however, this has been achieved through relatively few studies, carried out by a small number of researchers. Inevitably this has led to a patchy understanding of the Palaeolithic occupation of Syria with research being concentrated in particular areas (most notably the Valleys of Orontes, Euphrates and Nahr el-Kebir, as well as the El Kowm basin in central Syria and the Yabrud-Nebek region north of Damascus). Whilst limited in focus, such restricted studies do, however, enable a more complete understanding of the research frameworks within which these projects were carried out than may otherwise have been the case.

Research into the earlier Palaeolithic archaeology of Syria has been ongoing for approximately a century, and can be considered in terms of four broad chronological periods. An initial phase of casual artefact accumulation in the early twentieth century was followed by a period between the two world wars in which the first systematic archaeological surveys and excavations were carried out. This was followed in the decades after the Second World War by a notable expansion in fieldwork, characterized by attempts to establish regional typological sequences based on the composition of lithic assemblages. Finally, from the

1980s onwards, there has been an emphasis upon gaining a better understanding of the technological features which underlie artefact variability, as well as increased chronostratigraphical control of earlier Palaeolithic archaeological assemblages.

Although the earliest recorded instances of earlier Palaeolithic artefact occurrences in Syria date to the first decade of the twentieth century (e.g. Arne 1909), Europeans travelling through the wider Near East recognised and collected Palaeolithic artefacts (particularly handaxes) from at least the latter half of the nineteenth century (e.g. Lartet 1865; 1877, Zumoffen 1897; 1900; 1908, Bovier-Lapierre 1908). These finds were often deposited in museums in the region, resulting in the accumulation of large artefact collections in Damascus, Beirut and Jerusalem. However, due to the casual means by which they were amassed, such collections tend to lack contextual detail and have proved to be of little analytical value. It was only after the end of the First World War that Palaeolithic findspots became the subject of systematic archaeological investigation.

Between the wars Palaeolithic research in the Syria was carried out against the backdrop of the French mandate over the country (see Gelin 2002), which saw the first systematic surveys of Pleistocene deposits and the recovery of stratified artefact collections (Passemard 1926, Vaufrey 1931, Burkhalter 1933, Haller, 1945-1948, Pervès 1945; 1948), as well as a large number of surface finds (e.g. Mallon 1925, De Morgan 1927, Passemard 1927a; 1927b, Baudoin and Burkhalter 1930, Burkhalter 1933, Potut 1937). This period also saw the first excavation of an earlier Palaeolithic site, Yabrud rockshelter 1 (Rust 1933; 1950). Carried out between 1930 and 1933, the excavations at Yabrud formed part of a wider focus of research on Near Eastern cave sequences (e.g. Zuttiyeh; Turville-Petre 1927, Tabun and Skhul; Garrod and Bate 1937, Shukbah; Garrod and Bate 1942, Qafzeh, Umm Qatafa, Abu Sif, et-Tabban, Larikba, Ghrar, Sahba and Erq el-Ahmar; Neuville 1951). Following a research tradition developed in Europe (see O'Connor 2007), these investigations aimed to recover deeply stratified "cultural sequences" that could be correlated with one another in order to create regional artefact chronologies based on the succession of lithic industries. In order to achieve this, researchers placed great emphasis on the recovery of artefacts which were considered to be *fossile directeurs*; pieces which were seen to be spatially and typologically distinct and thus able to act as "index fossils".

However, following the Second World War, there was an increasingly widespread realisation by Palaeolithic researchers working in Europe and Africa that a reliance on *fossile directeurs* failed to accurately depict the variability apparent within and between earlier Palaeolithic stone tool assemblages. This resulted in a shift in emphasis away from attempts to categorize assemblages using index fossils towards analytical systems which placed emphasis upon the relative frequencies of particular artefact forms (e.g. Bordes 1950; 1961, Kleindienst 1961; 1962, Leakey 1971). In Syria, as in the Near East in general, this shift in emphasis had a significant impact on approaches taken to the analysis of earlier Palaeolithic stone tool assemblages. However, unlike in Europe and Africa, it did not lead to the introduction of new classificatory systems based on local artefact assemblages, but instead involved the modification of existing type lists originally developed in European and African contexts. Significantly, the origin for the classificatory systems used to categorize Near Eastern assemblages tends to have varied according to whether the material was considered to be characteristic of the Lower or Middle Palaeolithic. In the case of the former, typological systems originally based on African material were generally adopted (e.g. Clark 1966a; 1966b; 1967; 1968, Besançon *et al.* 1978a; 1978b, Copeland and Hours 1978; 1979; 1993), whilst in the case of the latter modified versions of Bordes (1950; 1961) classificatory system, originally developed for use in the south-west of France, came to dominate research (e.g. Bordes 1955; 1962, Schroeder 1966; 1969, Copeland 1975).

As a consequence of these differences in classificatory systems differing research traditions came to dominate Lower and Middle Palaeolithic studies in the decades following the Second World War. Investigations of the Middle Palaeolithic archaeological material from the Near East (including Syria) mostly drew inspiration from Europe (in particular France) where attempts to classify cultural variability via the typo-technological characteristics of archaeological assemblages tend to have dominated research. In contrast Lower Palaeolithic studies tended to be directed by developments in Africa where the ecological and subsistence activities associated with archaeological assemblages came to dominate research agendas. For example, such differences are clearly apparent through comparison of Lorraine Copeland's (1975; 1981) studies of Middle Palaeolithic assemblages from Syria with J. D. Clark's (Clark 1966a; 1966b; 1967; 1968) studies of the Lower Palaeolithic assemblages from Latamne.

This divergence in research influences is, at least partly, a result of the different research backgrounds of individual scholars. For instance Clark's experience lay in the study of African material, whilst Copeland has worked extensively with researchers whose background was in European research (most notably Dorothy Garrod and Francis Hours). However, historical contingencies are also arguably an important factor. The first excavations of earlier Palaeolithic sites in the Near East were focussed on caves (see above), which not only produced stone tool assemblages similar to those from Middle Palaeolithic sites in Europe (Garrod 1937, Rust 1950, Neuville 1951), but also human fossils considered analogous to the European Neanderthals (Keith 1927; 1931, 173-224, McCown and Keith 1937). Thus, there was arguably a natural affinity between the Middle Palaeolithic of the Near East and Europe. In contrast, Lower Palaeolithic sites from the region only became a major focus of research after 1945 (e.g. 'Ubeidiya; Stekelis *et al.* 1960, and Latamne; Van Liere 1960), by which time there was a growing acceptance of the ultimate African origin of the human species. As a result, it is perhaps unsurprising that researchers tended to draw parallels between Lower Palaeolithic assemblages from the Near East and Africa.

What unites these two approaches to the study of earlier Palaeolithic archaeological assemblages is the same essential mode of investigation. Both approaches sought to draw typo-technological parallels between lithic assemblages from the Near East and other parts of the world, and both explicitly suggested that biological connections between early human populations in the Near East and further afield are reflected in archaeological assemblages. As a consequence, such approaches frequently characterize Syria and the wider Near East as a conduit for human migrations, with lithic assemblages simply serving to track human population movements. Arguably, this had a negative impact upon Palaeolithic research in the region, which focused firmly on a global scale, allotting little importance to specific local contexts. Studies of lithic variability that considered Near Eastern assemblages in terms of hominin populations actively engaged in social and subsistence activities in their local landscapes were, therefore, rarely attempted.

Although research into the earlier Palaeolithic record of the Syria and the Near East is still frequently tied into discussions relating to early human population dispersals (e.g. Kaufman 2001, Bar-Yosef and Belfar-Cohen 2001, Saragusti and Goren-Inbar 2001), since the late 1980s there has been a move away from approaches to the archaeological record based on descriptive lithic typologies to those which seek to illustrate the technological features which lead to the production of particular lithic artefacts. The catalyst for this change lay in the realisation that divergent technological strategies could be responsible for morphologically identical artefacts (Copeland 1983b; 1995, Callow 1986, Marks and Volkman 1983; 1987, Boëda 1995, Meignen 1995). Consequently, it became increasingly clear that classificatory systems based on the morphology of stone tools creates rigid, yet frequently arbitrary, analytical categories which subsume a complex continuum of artefact variability.

In reaction to this, the last twenty years has seen a general trend for researchers to seek to reconstruct past sequences of technical action (e.g. Meignen and Bar-Yosef 1991, Meignen, 1995; 1998, Marks and Monigal 1995, Hovers 1998, Boëda *et al.* 2001). Frequently referred to as the *chaîne opératoire*, this allows some insight into the specific technical acts undertaken at given points in the landscape or within sites and choices made by hominins concerning how these were achieved (raw material extraction, tool maintenance, discard etc.), potentially revealing spatial and temporal information about human tool-use on an ethnographic scale. Such approaches have been heavily informed by refitting studies (e.g. Van Peer 1992, Schlanger 1996), microwear analysis (e.g. Shea 1988; 1989; 1993; 1997, Plisson and Beyries 1998) and intrasite spatial analysis (e.g. Hietala and Stevens 1977, Henry 1998a), the fine-grained contextual nature of such studies being enhanced through increasing use of techniques such as micromorphological analysis of sediments (e.g. Goldberg & Bar-Yosef, 1998).

Furthermore, since the 1980s advancements in absolute dating techniques have had a profound affect on how the earlier Palaeolithic record is viewed. Not only has it become clear that human occupation in the Near East dates back to over 1 mya (Belmaker *et al.* 2002), but it has also become increasingly apparent that the relationship between archaeological assemblages classed as Lower and Middle Palaeolithic is not as clear cut as previously thought. Traditionally, typo-technologically Middle Palaeolithic assemblages containing Levallois cores and lacking handaxes were all considered to post-date 100,000 kya (Copeland 1975). However, recent dating of assemblages such as those from Hayonim Levels F and Lower E (Rink *et al.* 2004b, Mercier *et al.* 2007), Rosh Ein Mor (Rink *et al.* 2003) and probably Tabun Level D (Mercier *et al.* 1995, Mercier and Valladas 2003; see also Rink *et al.* 2004a), suggests that these assemblages are at least 200,000 kya old, thus making them contemporary with some typo-technologically Lower Palaeolithic assemblages containing handaxes (e.g. Holon; Porat 2007). Consideration of the implications of these new absolute dates is only just beginning, but clearly they suggest that we may have to rethink some fundamental assumptions concerning technological variability in the earlier Palaeolithic.

2.3 Current state of research – problems and potential

The adoption of technological approaches to the study of earlier Palaeolithic stone tool assemblages from Syrian and other Near Eastern contexts has had a significant impact on earlier Palaeolithic research. Drawing upon two existing academic traditions - social anthropology (especially the work of André Leroi-Gourhan; see Leroi-Gourhan 1993) and philosophies of technologies (most notably the work of Gilbert Simondon; see Audouze 1999) - these approaches aim to illustrate the processes underlying technical acts through the study of technique, method and the *chaîne opératoire.* "Technique" (or manner/gesture as it is sometime known; *cf.* Baumler 1995, 13) refers to how a technical act is enacted. "Method" equates to the knowledge that is required in order to engage in and achieve the realisation of a particular technical act (Audouze 1999, 174). Such knowledge has been characterized as consisting of "*connaissance*" (abstract knowledge of how to carry of a particular technical act) and "*savoir faire*" (which could be termed practical knowledge, know-how and skill), which are combined in the achievement of the technical act itself (Pelegrin 1990; 1991; 1993; *cf.* Boëda 1995). Finally, the "*chaîne opératoire*" can be broadly defined as the sequential succession of acts and gestures used in order to achieve any given technological act (see Schlanger 1994).

In order to apply such concepts to the quantification and definition of particular technological acts contained within the archaeological record, recent researchers - most notably Eric Boëda (1986; 1995, Boëda *et al.* 1990) - have combined these concepts with the work of technological philosophers such as Gilbert Simondon. Simondon sought to define technological systems and how they evolve. Technological systems are seen as being made up of a series of constituent parts. These systems are argued to evolve through the integration of these parts, but can become fixed if the technological criteria which define them become so closely integrated they can not be disassociated (see Audouze 1999). Through applying these concepts to stone tools assemblages, researchers such as Boëda have been able to identify technological systems (*structures de débitage* and *structures de façonnage*) within which different methods of lithic-working can be further defined, these constituting individual "technical principles".

In practical terms, what this has meant for studies of earlier Palaeolithic stone tool assemblages from Syria and the wider Middle East is that researchers have begun to accept such principles and use them to document and examine technological variability within and between lithic assemblages (e.g. Meignen and Bar-Yosef 1991, Meignen, 1995; 1998, Marks and Monigal 1995, Hovers 1998, Boëda *et al.* 2001). It should be noted, however, that the application of these principles to the study of the earlier Palaeolithic record of the region has been far from uniform. Generally, the focus has been on techno-typologically Middle Palaeolithic assemblages associated with evidence of Levallois flaking, whilst technological analysis of handaxe-dominated assemblages has been rare. Nevertheless, even though further research is required, we are beginning to gain a more accurate insight into the technological variability which characterizes earlier Palaeolithic stone tool collections from Syria and the wider Near East. In addition, the last twenty years has seen some researchers move away from consideration of the earlier Palaeolithic record of the Near East as a simple reflection of linear and uniform Africa-Eurasian cultural evolution towards research which seeks to use such material to help understand hominin technological decision making and landscape-use in the Near East (e.g. Meignen *et al.* 2006). However, such approaches are only just beginning to receive widespread consideration and are mostly confined to the southern Levant, with the contribution that sites in Syria can make going largely unrecognised.

In short, the study of the earlier Palaeolithic archaeological record of Syria, and indeed that of the whole Near East, can be considered to be at a point of inflection. Research carried out over the last two decades has begun to give us a more accurate picture of the technological characteristics of individual archaeological assemblages, as well as a firmer handle on the dating of some important artefact occurrences. In terms of an integrated picture, however, what this research perhaps most clearly demonstrates is that we need to reassess some of the fundamental assumptions about the evolutionary frameworks traditionally used to illustrate cultural change. Furthermore, there has been an increasing realisation that the earlier Palaeolithic record of the Near East has more to offer than simply acting as a means of tracking biological dispersals and technological evolution out of Africa and Europe. As an area of the world with a rich Palaeolithic record and long standing research tradition, in its own right it has much to offer relating to the behaviour and landscape-use associated with early human populations.

2.4 Where are we now? Towards a framework for investigating settlement history, technological variability and landscape-use during the earlier Palaeolithic in Syria

This chapter has outlined how approaches to studying the earlier Palaeolithic record of the Near East in general, and Syria in particular, have changed over the last century. During recent decades there has been a general move towards approaches which consider the factors responsible for technological variability and a gradual acknowledgement that the earlier Palaeolithic archaeological record from the region has the potential to provide important insights into the early hominin behavioural practices and landscape-use. Although the full implications of this paradigm shift are only just beginning to be realised, it is already clear that in order to advance our understanding of the earlier Palaeolithic record we have to reassess some fundamental assumptions regarding technological variability and cultural change. In order to do this, we need to turn to the existing archaeological record afresh and undertake new technological analyses.

This thesis therefore seeks to re-examine the earlier Palaeolithic record of two archaeologically rich, yet under-researched areas of Syria - the Orontes and Euphrates Valleys - through the technological analysis of artefact collections. The approach taken is informed by concepts, practices and terminology drawn from investigation of similar assemblages both within the Near East and beyond. The specific methods of technological analysis undertaken (see chapter three) are designed to study earlier Palaeolithic stone tools on an assemblage level and combines modified versions of approaches outlined by Boëda (1986; 1995), Boëda *et al.* (1990), Ashton and McNabb (1996), Ashton (1998c), White (1996; 1998) and Scott (2006). By following this approach, the technological variability apparent between assemblages from the Orontes and Euphrates Valleys can for the first time be documented and investigated, and compared to broader patterns apparent within the region as a whole. This also enables related aspects of hominin behaviour and landscape-use to be considered on both the local and regional scale. Specifically, the analysis undertaken in this study will be directed towards answering the following questions:

- What can the earlier Palaeolithic archaeological record of the Orontes and Euphrates Valleys tell us about settlement history in these regions?

- What technological variability is apparent amongst the selected assemblages studied?

- What factors are likely to be responsible for this variability?

- How does this technological variability relate to hominin behaviour and landscape-use practices?

- How does technological variability relate to any apparent cultural change?

This research therefore aims to contribute to the emergence of Syria, and the Near East in general, as a region that can inform us about early human technological decision making, behaviour practices and landscape-use.

Chapter 3
Site Selection and Methodology

3.1 Aims and objectives

This thesis examines earlier Palaeolithic settlement history, technological variability and landscape-use in Syria as illustrated by lithic assemblages recovered from locations in the Orontes and Euphrates Valleys. Previous investigations of this material have focussed on placing assemblages within evolutionary frameworks constructed through the identification of dominant typological characteristics (see chapter two). In contrast, this research has been geared towards determining the technological characteristics of these assemblages in order to assess both the technological acts responsible for their composition and the wider behavioural and landscape-use practices which resulted in their deposition.

Although in many cases they lack absolute dates, the earlier Palaeolithic sites studied in this thesis can all be said to have been deposited at some point during the period from ~1.20 mya to ~30 kya. As this is clearly an immense timeframe, the deliberate decision has been made to divide the material studied between collections considered to be "earlier" and "later" in date. Following traditional nomenclature this has led to some assemblages being classed as "Lower Palaeolithic" and others as "Middle Palaeolithic." When possible, this distinction has been based on direct dating evidence. However, where such evidence is lacking (particularly in the case of surface accumulations) or is equivocal, the typo-technological characteristics of the collections have been used to suggest a broad chronological attribution.

Generally speaking, a consensus has arisen that the transition between the Lower and Middle Palaeolithic is not defined by any particular event, but by a suite of behavioural changes apparent from at least 300-250 000 kya (Marine Isotope Stage - henceforth MIS - 9/8). These include changes in hunting techniques and patterns of landscape-use, and, significantly, the widespread adoption of Levallois flaking (papers in Ronen 1982, Gamble and Roebroeks 1999). Whilst acknowledging that Levallois cores can appear sporadically in assemblages dated to before MIS 9/8 (*cf.* White and Ashton 2003), assemblages which contain notable quantities of Levallois material are here considered to be "Middle Palaeolithic" in character. This division is used as a heuristic device, but does not imply that Levallois flaking in the Near East is necessarily restricted to the post-MIS 9/8 period.

Due to the limited number of sizeable artefact collections recovered from locations in the Orontes and Euphrates Valleys, this research encompasses both stratified and surface collections, as well as material that has undergone varying degrees of post-depositional disturbance. Indeed, only a single site (the Latamne "Living floor") can be considered to have produced material from a secure primary context, and even in this case it is debatable whether the material represents a single "snapshot" of hominin activity, or is the product of repeated visits over a period of time. Consequently, the majority of the collections studied in this thesis are either relatively undisturbed artefact accumulations, representative of repeated activity within particular landscape settings over an unknown period of time, or are derived assemblages which are reflective of hominin behaviour in a wide landscape catchment over an undefined timeframe.

In order to achieve the stated aims of this thesis, analysis of all selected assemblages has been geared towards assessing the typo-technological characteristics of individual assemblages. However, differences in depositional history and recovery practices obviously have a significant impact upon both the appropriate scale of analysis and the kind of information that can be drawn from individual artefact collections. As a consequence, initial investigation of all the selected assemblages studied involved an assessment of what detail of recording was appropriate for each collection. This was achieved through an examination of the condition of the artefacts, the composition of the material and the published details of recovery context. Having established the depositional context and taphonomic history of each selected artefact assemblage it was then possible to identify which attributes to record on a collection-by-collection basis.

3.2 Site selection criteria

The assemblages selected for detailed technological study represent those that were considered to have the greatest potential for achieving the stated aims of this thesis. The criteria on which this choice has been based are the context of an assemblage, nature of recovery, its taphonomic history and the size of the collection:

- All primary context accumulations - deposited contemporaneously with the sediments from which they were recovered - were analysed. However, as only one definite example of such an accumulation has been recovered from the Orontes and Euphrates Valleys, selected secondary context sites have also been analysed.

- All excavated assemblages have also been analysed, since such assemblages provide the most representative accumulations of artefacts from a particular findspot. However, as only two locations in the Orontes and Euphrates Valleys have been subject to such investigation selected systematic surface collections have also been analysed.

- Analysis has focused on material which has undergone minimal post-depositional disturbance as such material enables an assessment of hominin technological decision making and landuse practices at a particular point in the landscape. However, although sufficient numbers of relatively undisturbed techno-typologically Middle Palaeolithic assemblages have been recovered from the Orontes and Euphrates Valleys, only four Lower Palaeolithic collections have been recovered which contain material which fulfils this criteria. As a consequence, some fluvially derived Lower Palaeolithic assemblages have also been considered.

- In order to maximise the chance of studying a representative sample, analysis of fluvially derived assemblages has focussed on those containing >100 pieces. The main exceptions to this are collections thought to be of notable antiquity.

Although selection of the earlier Palaeolithic assemblages was to some extent further limited by the availability and the curation history of material, the impact of these factors was reduced by the fact that all of the earlier Palaeolithic assemblages from the Orontes and Euphrates which fulfil the selection criteria outlined are stored together in the National Museum, Damascus, Syria.

The following assemblages were selected for detailed technological analysis (see figure 3.2.1):

<u>**Sites in the Orontes Valley**</u>

Abu Obeida	?psuedo-artefacts
Maharde 2	?psuedo-artefacts
Khattab 2	?psuedo-artefacts
Abu Habibe	?psuedo-artefacts
El-Farche 1	?psuedo-artefacts
Khor-El Aassi	?psuedo-artefacts
Rastan	Lower Palaeolithic
Latamne "Living floor"	Lower Palaeolithic
Gharmachi 1	Lower Palaeolithic
Jrabiyat 2, 3 and 4	Lower Palaeolithic

Tahoun Semaan 2 and 3	Middle Palaeolithic
Tulul Defai	Middle Palaeolithic
Latamne "Red colluvium"	Middle Palaeolithic
Tahoun Semaan 1	Middle Palaeolithic

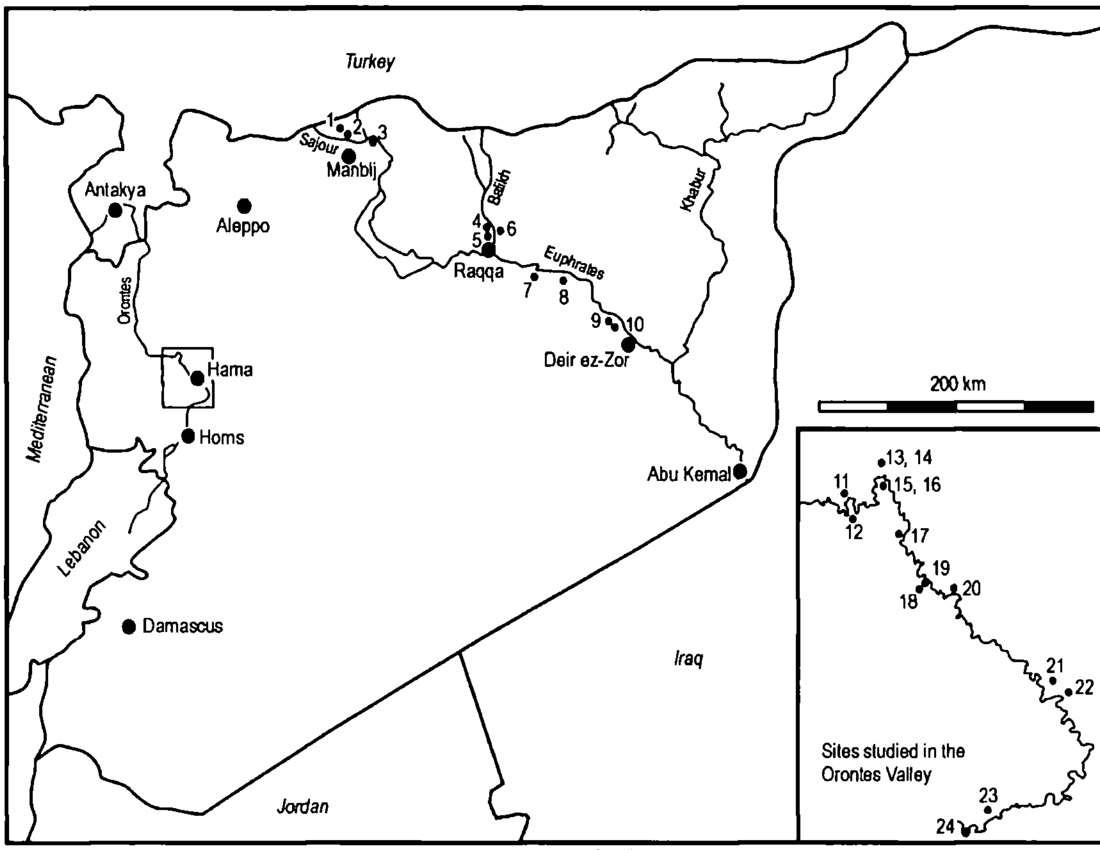

Figure 3.2.1 Location map illustrating position of selected sites:

1.	*Qara Yaaqoub*	*9.*	*Ain Tabous*	*17.*	*Gharmachi I*
2.	*Halouanndji IV*	*10.*	*Ain Abu Jemaa*	*18.*	*Khattab 2*
3.	*Hammam Kebir II*	*11.*	*Abu Obeida*	*19.*	*Jrabiyat 2, 3 and 4*
4.	*Rhayat 2*	*12.*	*Maharde 2*	*20.*	*Tulul Defai*
5.	*Chnine West I*	*13.*	*Latamne "Living floor"*	*21.*	*Abu Habibe*
6.	*Chnine East I*	*14.*	*Latamne "Red colluvium"*	*22.*	*El-Farche I*
7.	*Hamadine*	*15.*	*Tahoun Semaan I*	*23.*	*Khor-el Aassi*
8.	*Maadan 1 and 5*	*16.*	*Tahoun Semaan 2 and 3*	*24.*	*Rastan*

Sites in the Euphrates Valley and tributaries:

Maadan 1 and 5	Lower Palaeolithic
Ain Abu Jemaa	Lower Palaeolithic
Ain Tabous	Lower Palaeolithic
Hamadine	Lower Palaeolithic
Hammam Kebir II	Lower Palaeolithic
Halouanndji IV	Lower Palaeolithic
Rhayat 2	Middle Palaeolithic
Chnine East 1	Middle Palaeolithic

Chnine West 1	Middle Palaeolithic
Qara Yaaqoub	Middle Palaeolithic

All assemblages were recorded using an integrated methodology (see section 3.3) aimed at demonstrating contextual integrity and technological variability. The exact technological features recorded for an assemblage differed according to the scale of analysis considered appropriate. This varied according to contextual integrity, taphonomic history and recovery practices (see above). The specific reasoning underlying the particular analytical approaches adopted is explained in detail for each of the individual assemblages analysed (see chapters five, six, eight and nine).

3.3 Methodology for recording artefacts

3.3.1 All artefacts; qualitative variables relating to condition

The observations outlined below were recorded for all artefacts, and used to assess the taphonomic histories of the selected assemblages. The physical effects of movement and re-arrangement are recorded (abrasion, edge damage, battering and scratching) and used to assess the degree to which assemblages have been subject to such processes (*cf.* Wymer 1968, Shackley 1974, Schick 1986). However, no systematic attempt has been made to assess the duration or distance of movement, or the energetic regime by which artefacts were moved (*cf.* Chambers 2003). Chemical alteration to artefact surfaces was also noted (patination and staining). Although the interpretation of such surface alteration is as yet poorly understood (Shepherd 1972, Stapert 1976), it may relate to contrasts in surface exposure or burial environment, and could therefore potentially be indicative of different taphonomic histories of artefacts within collections.

1. Abrasion:
    0. Unabraded.
    1. Slightly abraded.
    2. Moderately abraded.
    3. Heavily abraded.

2. Edge Damage:
    1. No edge damage.
    2. Slight edge damage.
    3. Moderate edge damage.
    4. Heavy edge damage.

Where more than one phase of edge damage was noted (e.g. a patinated and less heavily patinated phase) each was recorded separately.

3. Staining:
    0. Unstained.
    1. Slightly stained.
    2. Moderately stained.
    3. Heavily stained.

4. Patination:
    0. Unpatinated.
    1. Lightly patinated.
    2. Moderately patinated.
    3. Heavily patinated.

5. Surface scratching:
    0. No scratching.
    1. Light scratching.
    2. Moderate scratching.
    3. Heavy scratching.

6. Battering (characterised by incipient cones visible on artificially flaked surfaces):
    0. No battering.
    1. Light battering.
    2. Moderate battering.
    3. Heavy battering.

3.3.2 All artefacts; qualitative variables relating to raw material and technology

1. Raw material type. This was determined macroscopically. Chert and flint pieces are grouped in a single category due to the fact it was not always possible to distinguish between the two, particularly in the case of heavily stained and/or patinated pieces. The following raw material types were recognised:
    1. Chert/flint.
    2. Basalt.
    3. Quartzite.
    4. Quartz.
    5. Limestone.

2. Probable raw material source. This could be determined for artefacts on chert/flint blanks through examination of any remnant cortex. Chert/flint obtained directly from a chalk/limestone outcrop retains unrolled cortex which is frequently thick and chalky, whilst chert/flint derived from river gravel retains thin, rolled cortex, often with chatter marks resulting from clast collision. The source of the raw material could not be determined for artefacts not on chert/flint blanks. The following categories were recognised:
    1. Fresh.
    2. Derived.
    3. Indeterminate.

3. Mode of percussion used to produce a product, or to flake a nodule:
    1. Hard. Hard-hammer products exhibit a pronounced bulb of percussion and a thick butt; hard hammer scars exhibit the same features in negative.
    2. Soft. Typical soft-hammer products tend to be relatively thin, exhibit a curved profile, a diffuse bulb and a thin, wide butt, which is frequently lipped. Soft-hammer scars exhibit the same features in negative.
    3. Mixed. An artefact which retains both hard and soft hammer scars was recorded as mixed.
    4. Indeterminate. Although the features described above are characteristic of typical hard and soft hammer products and scars, artefacts often exhibit a mixture of features indicative of either mode of percussion. Where mode of percussion could not be definitively stated, artefacts were recorded as indeterminate.

3.3.3 Flakes (non-Levallois)

In the absence of any refitting studies and given that non-Levallois flakes may result from a variety of reduction strategies, analysis of such material was directed towards recording taphonomically informative attributes (e.g. dimensions as reflective of size distribution) and technological criteria relating to lithic reduction in a general sense (e.g. cortex retention as a reflection of broad reduction stage), rather than the specific methods employed.

Quantitative Variables

1. Length (mm) measured along the axis of percussion.

2. Breadth (mm). Refers to the maximum width of a flake at 90° to the axis of percussion.

3. Maximum thickness (mm).

4. Number of dorsal scars. Only scars with a minimum dimension of at least 5mm are included in this count.

Qualitative variables

1. Measured (as a percentage) of the total surface area of the dorsal face of a flake that displays cortex, or consists of a natural surface.
    0. 0%.
    1. <50%.
    2. >50%.
    3. 100%.

2. Portion:
    1. Whole.
    2. Proximal.
    3. Distal.
    4. Mesial.
    5. Siret; flake has split along or parallel to the axis of percussion.

3. Butt type:
    1. Plain.
    2. Dihedral.
    3. Cortical.
    4. Natural (but non-cortical).
    5. Marginal.
    6. Soft hammer.
    7. Mixed (e.g. combination of natural and flake surfaces).
    8. Facetted.
    9. Missing.
    10. Trimmed; characterized by small flake scars running into dorsal surface along same axis as flake itself.
    11. Obscured (e.g. by damage).

4. Knapping pattern. This is judged by consideration of the orientation of previous flakes scars on the dorsal surface of the flake and includes the direction from which the flake itself was struck.
    1. Uni-directional.
    2. Bi-directional.
    3. Multi-directional.
    4. Wholly cortical.
    5. Obscured.

5. Relict core edge, Refers to whether or not a flake retains evidence of a platform on its dorsal surface or butt:
    1. Present.
    2. Absent.

6. Retouch:
    1. Yes; additional observations in retouched artefacts section (see section 3.3.10).
    2. No.

3.3.4 Blades

No products resulting from dedicated blade production were encountered. The small numbers of metrical blades identified are included amongst the flake assemblages.

3.3.5 Cores (non-Levallois and non-blade)

Non-Levallois and non-blade cores were grouped according to the general method which characterized their reduction (e.g. migrating platform, discoidal etc.), whilst analysis was geared towards establishing whether any clear technological factors - such as reduction intensity or raw material size - could account for the characteristics exhibited by such cores. In addition, individual core episodes comprising the reduction of particular cores were identified and classified following a modified version of the methodology devised by Ashton and McNabb (1996).

Quantitative Variables

1. Maximum dimension (mm).

2. Weight (grams).

3. Total number of core episodes. Core reduction can be regarded as being divided into a series of separate stages, termed core episodes; each episode comprises a series of removals which naturally follow on from each other, from the same platform.

4. Total number of removals. This only includes scars with a minimum dimension of 5 mm.

Qualitative variables

1. Characterisation of overall core-reduction method:

    1. Migrating platform. Such cores are characterised by *ad hoc* exploitation of multiple platforms as they become available throughout the reduction sequence.

    3. Single platform unprepared. These are cores worked from a single unprepared platform.

    4. Bipolar unprepared. These cores are worked from two opposed, but unprepared platforms.

    5. Discoidal. Such cores display evidence of alternate/alternating flaking from a single, peripheral platform into the volume of two non-hierarchically related surfaces (*cf.* Boëda 1995).

2. Blank type. This is inferred from distribution of cortex/natural fracture surface, or relict ventral/dorsal. The following categories were recognised:

    1. Nodule.
    2. Flake.
    3. Thermal/frost flake.
    4. Shattered nodule.
    5. Indeterminate.

3. Measure (as a percentage) of the total surface area of core which displays evidence of cortex or retains other evidence of a natural surface:

    0. 0%.
    1. >0-25%.
    2. >25-50%.
    3. >50-75%.
    4. >75%.

4. Blank Form Retained. This is an assessment of whether or not a core retains enough of the original blank to recreate its form:

    1. Yes.
    2. No.

5. Number of removals per core episode, classified by type after modified version of the methodology devised by Ashton and McNabb (1996):

A	Single removal	Scar resulting from the removal of a single scar from a natural platform, or scars resulting from a previous, unrelated core episode.
B	Parallel flaking	Two or more flakes removed in the same direction from the same or adjacent platforms.
C	Alternate flaking	The proximal end of one or more previous flake scars was used as the platform for the removal of a further sequence of one or more flakes.
D	Unattributed	A flake scar which can be recognised but not attributed to a particular sequence.

Table 3.3.5.1 Types of core episodes (after Ashton and McNabb 1996).

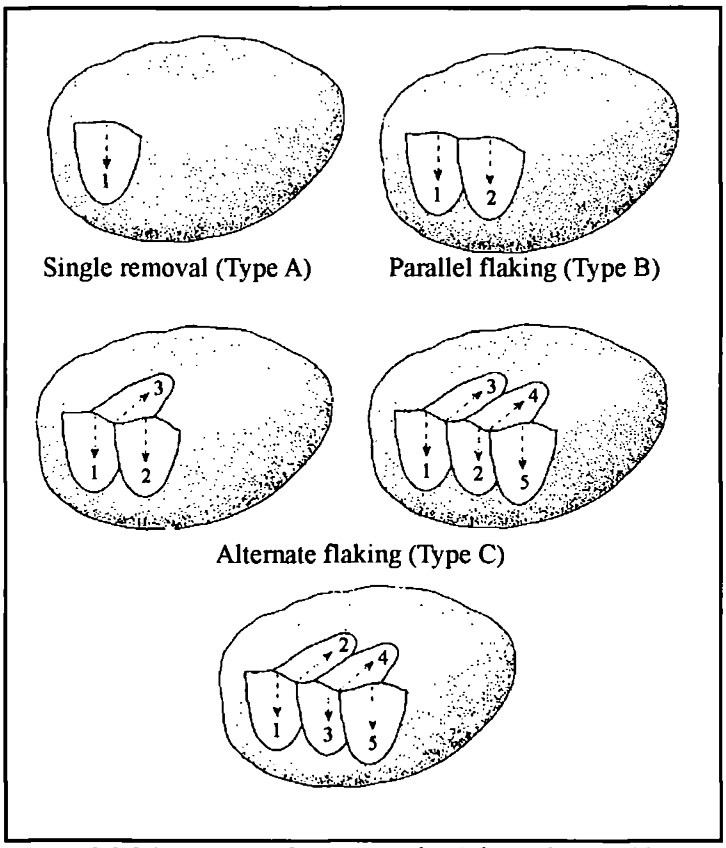

Figure 3.3.5.1 Types of core episodes (after Ashton 1998c).

6. Retouch:
    1. Yes; additional observations in retouched artefacts section (see section 3.3.10).
    2. No.

3.3.6 Blade cores

No dedicated blade cores were encountered during this research.

3.3.7 Levallois cores and simple prepared cores

Levallois cores were identified following Boëda's (1986, 1995) six point volumetric definition of the Levallois method (see table 3.3.7.1). Cores which conform to all six of

Boëda's criteria have been classed as Levallois cores, whilst those which possessed the distal and lateral convexities of a Levallois flaking surface but no consumptive Levallois removal (making it impossible to determine the fracture plane or axis of the predetermined blanks; criteria 4 and 5) were treated as unstruck Levallois cores (*cf.* Van Peer 1992). Furthermore, cores which exploited the natural convexities of a nodule and therefore did not retain evidence of deliberate configuration of a flaking surface (criterion 3), but did fulfill the other five of Boëda's criteria have been classed as simple prepared cores (*cf.* Kuhn 1995a).

1.	The volume of the core comprises two surfaces separated by a plane of intersection.
2.	The two surfaces are hierarchically related and non-interchangeable; one acts as a flaking surface and the other as a striking platform surface.
3.	The configuration of the flaking surface predetermines the morphology of the products through the management of the distal and lateral convexities (see figure 3.3.7.1).
4.	The fracture plane for the removal of predetermined blanks is parallel to the plane of intersection between the two surfaces.
5.	The point at which the striking platform surface and flaking surface intersect is perpendicular to the flaking axis of the predetermined flakes.
6.	Hard hammer percussion is employed.

Table 3.3.7.1 The six technological criteria defined by Boëda (1986, 1995) for identifying the Levallois method.

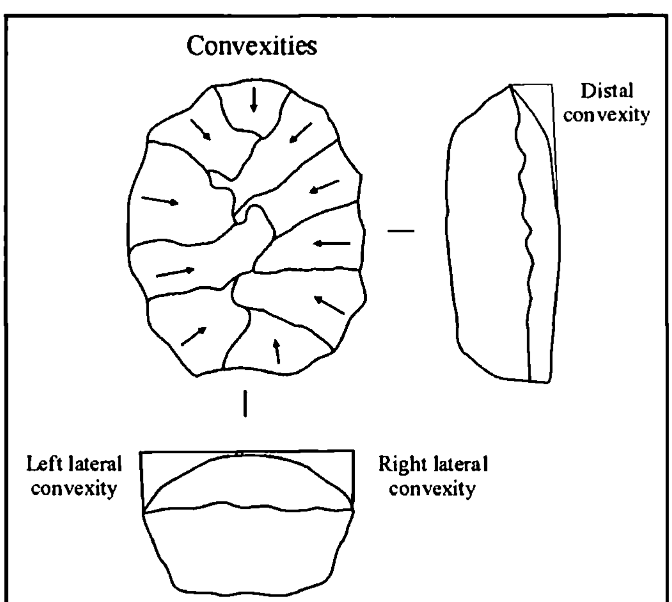

Figure 3.3.7.1 Illustration of the distal and lateral convexities necessary to allow successful exploitation of a Levallois flaking surface (after Scott 2006).

Quantitative variables

1. Length (mm). This is measure along the primary axis of Levallois flake removal, except in the case of unstruck cores, or cores subject to centripetal recurrent exploitation, in which cases the core is orientated in relation to the distal and lateral convexities.

2. Breadth (mm). This refers to the maximum width at 90° to the axis along which the length was measured.

3. Maximum thickness (mm).

4. Weight (grams).

5. Number of preparatory scars visible on the flaking surface with a minimum dimension of at least 5 mm.

6. Number of preparatory scars visible on the striking platform surface with a minimum dimension of at least 5 mm.

7. Number of definite Levallois products detached from the final flaking surface.

8. Dimensions of final Levallois products:
    1. Length (mm).
    2. Breadth (mm).

Indices

These are generated using quantitative variables and were taken from Scott (2006).

1. Elongation (Breadth/Length).

2. Flattening (Thickness/Breadth).

Qualitative variables

1. Type:
    1. Levallois.
    2. Simple prepared.

2. Blank type. This is inferred from distribution of cortex/natural fracture surfaces, or relict ventral/dorsal surfaces. The following types were recognised:
    1. Nodule.
    2. Flake.
    3. Thermal/frost flake.

4. Shattered nodule.
5. Indeterminate.

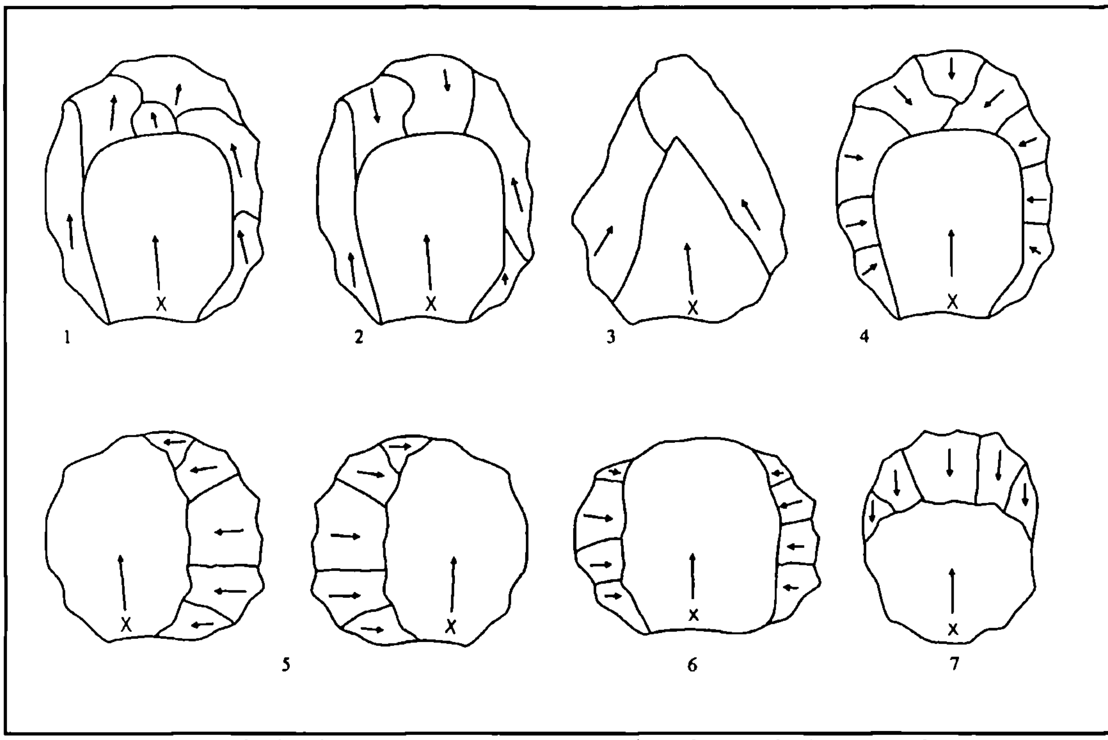

Figure 3.3.7.2 Methods of Levallois core preparation, based upon the location of preparatory flake scars (X=direction of Levallois removal): 1=unipolar, 2=bipolar, 3=convergent unipolar, 4=centripetal, 5=unidirectional lateral, 6=bipolar lateral, 7=unipolar distal (after Boëda 1986; 1995, redrawn by Scott 2006).

3. Method of preparation of final flaking surface (after Boëda 1986; 1995). This is defined according to the orientation of the removals which precede invasive, volumetrically consumptive removals interpreted as the result of the removal of Levallois products. The core is orientated along the dominant axis of Levallois flaking, or relative to the position of the distal and lateral convexities if unexploited. If the core has been subject to repreparation, the orientation of all previous scars is taken into account. Given that Levallois cores only provide direct information concerning the final phase of preparation and exploitation before discard (*cf.* Van Peer 1992), it is recognized that such techniques are not fixed and may have varied throughout the cores productive "life" (*cf.* Dibble 1995, Meignen 1995, Jaubert and Farizy 1995, Texier and Francisco-Ortega 1995). The following categories were recognised:
    1. Unipolar.
    2. Bipolar.
    3. Convergent unipolar.
    4. Centripetal.

5. Unidirectional lateral. This could reflect centripetal preparation, or the shifting of the striking platform after unipolar preparation or unipolar recurrent exploitation, however, in the absence of clear evidence indicative of one of these options preparation is recorded as unidirectional lateral (*cf.* Scott 2006).
6. Bipolar lateral.
7. Unipolar from distal.
8. Indeterminate i.e. it is a core fragment or the flaking surface is obscured.

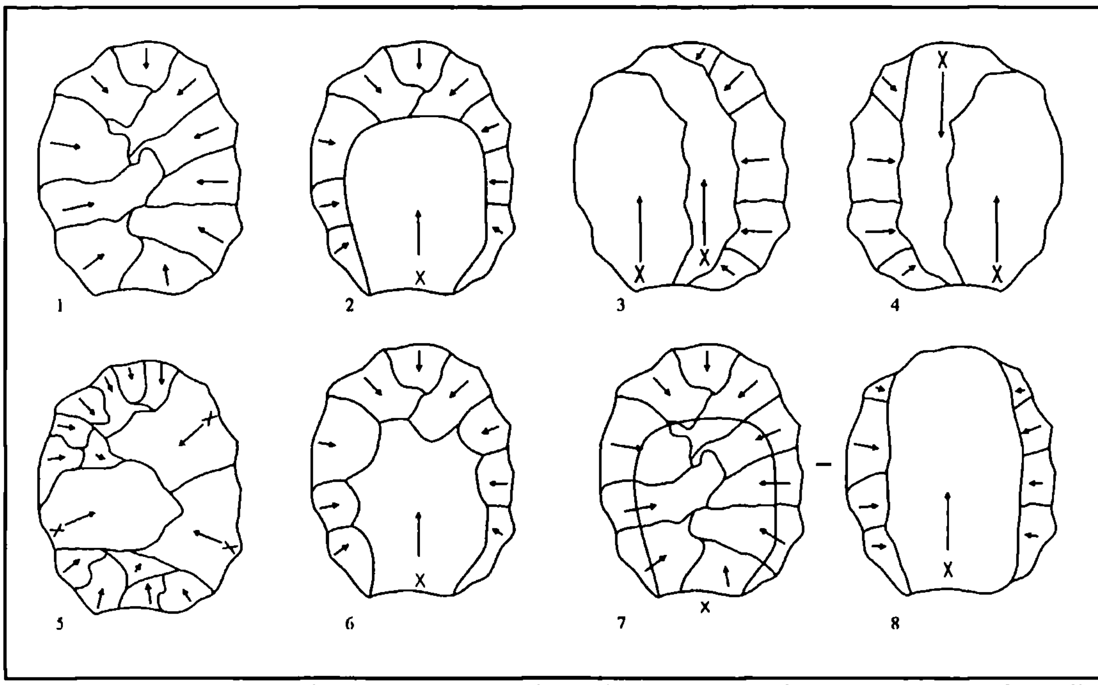

Figure 3.3.7.3 Method of exploitation of final Levallois flaking surface (X=direction of Levallois removal): 1=unexploited, 2=lineal, 3=unipolar recurrent, 4=bipolar recurrent, 5=centripetal recurrent, 6=re-prepared but unexploited, 7=failed; undetached, 8=failed; overshot (after Boëda 1986; 1995, redrawn by Scott 2006).

4. Method of exploitation of final flaking surface (after Boëda 1986; 1995). This is based upon the orientation of invasive, volumetrically consumptive flake scars interpreted as resulting from the removal of Levallois flakes. The following categories were recognised:

    0. Unexploited. The core conforms to the Levallois concept, but the flaking surface does not retain evidence of volumetrically consumptive scars resulting from Levallois flake production.

    1. Lineal. A single Levallois flake has been removed from the flaking surface of the core and was not preceded by an earlier Levallois flake from the same surface.

    2. Unipolar recurrent. Two or more Levallois flake scars have been removed from one striking platform on the same flaking surface.

3. Bipolar recurrent. Two or more definite Levallois flake scars have been removed from opposed platforms on the same flaking surface.
4. Centripetal recurrent. Two or more definite Levallois flakes scars have been removed from various locations around the periphery of the same flaking surface.
5. Re-prepared but unexploited. Such cores differ from those which display an unexploited flaking surface in that there is clear evidence for repreparation of the core following the removal of one or more invasive, volumetrically consumptive scar(s) interpreted as resulting from Levallois removal(s) from a previous surface.
6. Failed final removal. These are cores which display evidence of a single attempted Levallois removal that has failed to detach or has overshot the core edge.
7. Indeterminate. A core fragment or core which possesses a flaking surface that is obscured (e.g. by damage).

5. Evidence of an earlier flaking surface. Cores which preserve evidence of a previous phase of volumetrically consumptive flaking, cut by smaller, peripheral flake scars interpreted as deliberate re-preparation, are viewed as preserving evidence of an earlier flaking surface. The final flaking surface may or may not have been exploited.
    1. Yes.
    2. No.

6. Morphological description of Levallois products from final flaking surface:
    0. Unexploited
    1. Flake.
    2. Point.
    3. Blade.
    4. Debordant flake - has removed one or both lateral core edges.
    5. Overshot distal end.
    6. Debordant and overshot.
    7. Failed removal(s).

7. Measure (as a percentage) of the total area of the core's striking platform surface which displays evidence of cortex or retains other evidence of a natural surface:
    0. 0%.
    1. >0-25%.
    2. >25-50%.

3. >50-75%.
4. >75%.

8. Position of cortex on striking platform surface:
    0. None.
    1. One edge only.
    2. More than one edge.
    3. All over.
    4. Central.
    5. Central and one edge.
    6. Central and more than one edge.

9. Remnant distal ends of large scars on striking platform:
    1. Yes.
    2. No.

10. Retouch:
    1. Yes; additional observations in retouched artefacts section (see section 3.3.10).
    2. No.

3.3.8 Levallois products

Products were identified as being the result of Levallois reduction if they displayed characteristics indicating that they have been removed from the flaking surface of a Levallois core. Based on the attributes defined by Scott (2006) the following features are considered to be indicative of Levallois products:

- Struck using a hard hammer.

- Display a relatively large number of dorsal scars, and potentially a complex dorsal scar pattern.

- Are removed from a surface, rather than biting into the volume of a core, and are therefore relatively flat in longitudinal section.

- Exhibit the distal and lateral convexities which controlled detachment along the flaking axis, reflecting the fact that such flakes preferentially consume the flaking surface of the Levallois core.

- May retain evidence of deliberate platform preparation, such as faceting.

- May also retain evidence of deliberate convexity accentuation, in the form of relatively small peripheral flake scars.

Due to the fact that there is a degree of uncertainty in the identification of Levallois products (see Copeland 1983b; 1995, Marks and Volkman 1987, Boëda 1995, Meignen 1995) the probability of an individual product being deliberately produced from a Levallois flaking surface was noted as degree of confidence; definite, probable and possible. Although probable and possible Levallois products were recorded as Levallois products, analysis was concentrated on definite Levallois products alone in order that only technological actions definitely associated with Levallois flaking are discussed.

Quantitative variables

1. Length (mm) measured along the axis of percussion.

2. Breadth (mm). Refers to the maximum width at 90° to the axis of percussion.

3. Maximum thickness (mm).

4. Number of dorsal scars with a minimum dimension of at least 5 mm.

5. Number of preceding Levallois removals.

Index

This is generated using quantitative variables and was taken from Scott (2006).

1. Elongation (Breadth/Length).

Qualitative variables

1. Confidence of being a deliberately detached Levallois endproduct:
    1. Definite.
    2. Probable.
    3. Possible.

2. Measure (as a percentage) of the total surface area of the dorsal face of a Levallois product which displays cortex, or consists of a natural surface:
    0. 0%.

1. <50%.
2. >50%.
3. 100%.

3. Portion:
    1. Whole.
    2. Proximal.
    3. Distal.
    4. Mesial.
    5. Siret; product has split along or parallel to the axis of percussion.

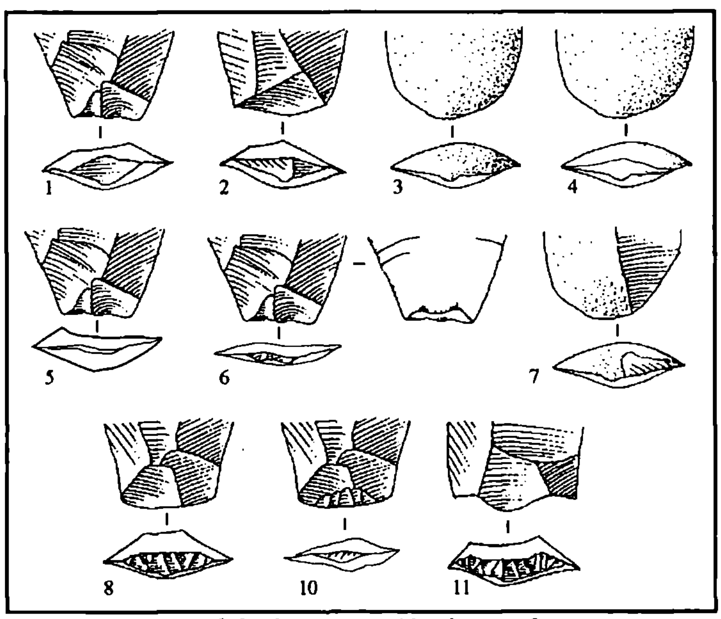

Figure 3.3.8.1 Flake butt types. Numbers refer to categories outlined below (after Inizan et al. 1999).

4. Butt type:
    1. Plain.
    2. Dihedral.
    3. Cortical.
    4. Natural (but non-cortical).
    5. Marginal.
    6. Soft hammer.
    7. Mixed (e.g. combination of natural and flake surfaces).
    8. Facetted.
    9. Missing.
    10. Trimmed; small flake scars running into dorsal surface along same axis as the product itself.

11. *Chapeau de Gendarme.*
12. Obscured (e.g. by damage).

5. Type of Levallois product in morphological terms:
    1. Flake.
    2. Point.
    3. Blade.
    4. Debordant flake (lateral edge of core removed).
    5. Overshot.
    6. Debordant and overshot.
    7. Indeterminate; partial endproduct which cannot be classified.

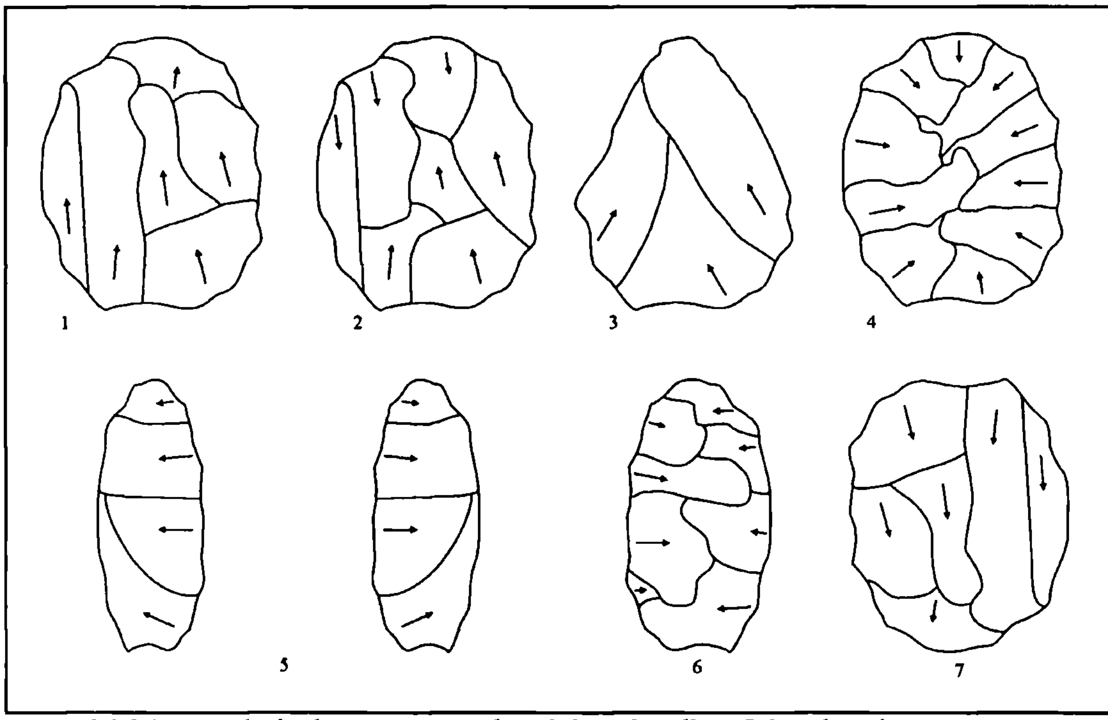

Figure 3.3.8.2 Method of preparation inferred from Levallois flakes, based upon orientation of non-Levallois flake scars: 1=unipolar, 2=bipolar, 3=convergent unipolar, 4=centripetal, 5 = lateral, 6=bipolar lateral, 7=unipolar distal (after Scott 2006).

6. Method of preparation (after Boëda 1986, 1995 and Scott 2006). This is based upon the orientation of preparatory flake scars, including previous Levallois flakes scars, since these are viewed as predetermining as well as predetermined.
    1. Unipolar.
    2. Bipolar.
    3. Convergent unipolar.
    4. Centripetal.

5. Unidirectional lateral i.e. all preparatory scars run in from the one edge. This could reflect the shifting of the striking platform after unipolar preparation, unipolar recurrent exploitation, or centripetal preparation when only part of the flaking surface was removed. Unless there is unequivocal evidence for one of these options, preparation is recorded as unidirectional lateral (Scott 2006).
6. Bipolar lateral i.e. preparatory scars run in from both edges. This could reflect the shifting of the striking platform after bipolar preparation or bipolar recurrent exploitation, or centripetal preparation when the flake did not actually reach the end of the core. However, if there is no unequivocal evidence for one of these options, preparation is recorded as bipolar lateral (Scott 2006).
7. Unipolar from distal.
8. Indeterminate; fragmentary, or the flaking surface is obscured.

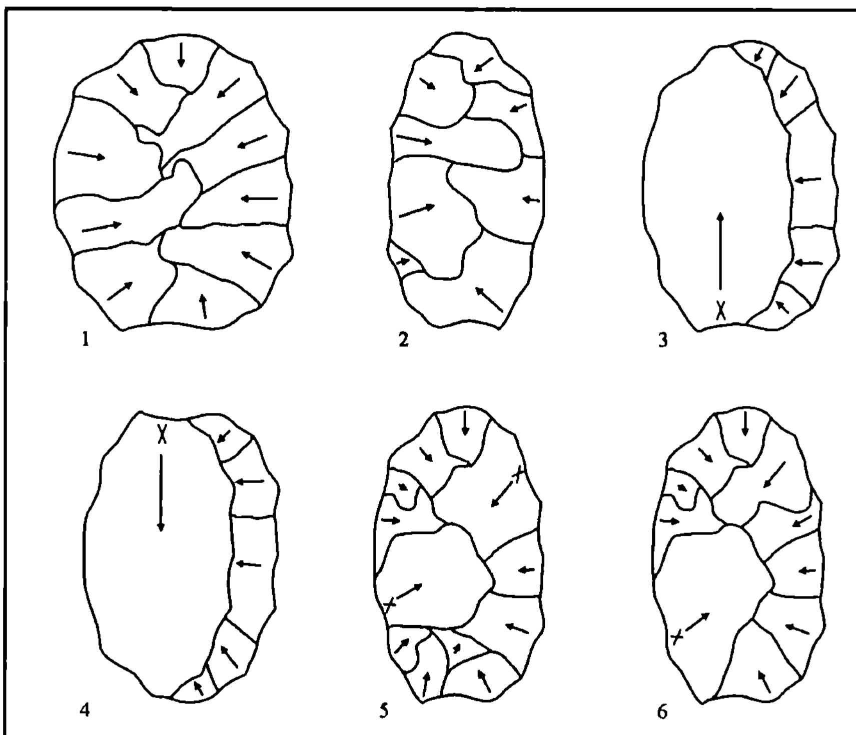

Figure 3.3.8.3 Illustration of scar patterns indicative of exploitation method on Levallois flakes: 1=lineal (up to core edges; clearly preventing removal of subsequent flake), 2=single removal, 3=unipolar recurrent, 4=bipolar recurrent, 5=centripetal recurrent, 6=indeterminate. (X=direction of preceding Levallois flake scar) (after Scott 2006).

7. Method of exploitation (after Boëda 1986, 1995 and Scott 2006). This is based upon the orientation of any previous Levallois flake scars retained on the product's dorsal surface, and whether the product itself can be definitively stated to have been the only Levallois product removed from a particular flaking surface. The following categories were recognised:

1. Lineal. The product does not retain any previous Levallois product scars and would clearly prevent the removal of a subsequent product i.e. it has obviously completely consumed the volume of the entire flaking surface, necessitating complete re-preparation before another product could be removed.
2. Single removal. The product does not retain any previous Levallois product scars but could potentially have been followed by another removal, so cannot definitively be stated to reflect lineal exploitation.
3. Unipolar recurrent. One or more previous Levallois products have been struck along the same axis as the product itself.
4. Bipolar recurrent. One or more Levallois product scars removed in opposition to, or in opposition to and in the same direction, as the product itself.
5. Centripetal recurrent. One or more Levallois product scars removed in various directions in relation to the product itself.
6. Indeterminate. It may not be possible to classify the exploitation phase even if a previous Levallois product scar is present. For instance, if a previous product scar is located slightly tangentially to the removal itself but was struck from the same platform, the product may have formed part of either a centripetal recurrent or unipolar recurrent sequence.

8. Evidence of repreparation of the flaking surface preceding the removal of the last flake. This is displayed in the form of smaller, less invasive scars cutting an obvious large, invasive Levallois removal.
    1. Yes.
    2. No.

9. Retouch?
    1. Yes; additional observations in retouched artefacts section (see section 3.3.10).
    2. No.

3.3.9 Handaxes

All the handaxes encountered during this research were recorded following an established and widely used methodology which documents variability in handaxe form (Roe 1964, 1968). Additional technological features were noted in order to assess the relative influence of material factors upon the final form of the handaxes, many of which are based upon the observations made by Ashton and McNabb (1994) and the methodology developed by White (1996, 1998).

Quantitative variables

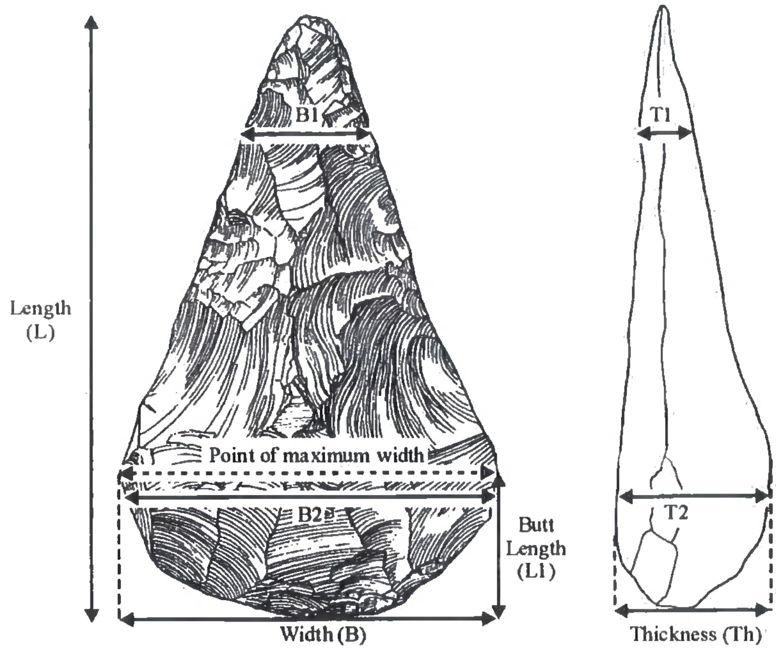

Figure 3.3.9.1 Measurements taken on handaxes; see Roe (1964, 1968) and White (1996, 1998).

1. Length (mm). This refers to the maximum distance from butt to tip parallel to the long axis of the handaxe.

2. Breadth (mm). This is measured as the maximum distance between the lateral margins of the handaxe perpendicular to the long axis.

3. Maximum thickness (mm) measured perpendicular to the long axis of the handaxe.

4. T1 (mm).Thickness of the handaxe at one fifth of the length from tip.

5. T2 (mm). Thickness of the handaxe at one fifth of the length from butt.

6. B1 (mm). The width of the handaxe at one fifth of length from the tip.

7. B2 (mm). The width of the handaxe at one fifth of length from the butt.

8. L1 (mm). The length of the handaxe measure from the point of maximum width.

9. Total number of edges.

10. Total length of cutting edge. This is a measurement of the portion of the handaxes circumference considered to represent a sharp cutting edge. An edge was considered sharp if it displayed an angle below 85°. The measurements are taken from an outline diagram on which the blunt edges are highlighted using a wheel-based distance meter.

10. Total number of scars with a minimum dimension of at least 5 mm, summed for both faces of the handaxe.

Indices

These are generated using the quantitative variables and are taken from Roe (1964; 1967) and White (1996; 1998):

1. Refinement. This expresses the relative thickness of a cross section of a handaxe compared to its width. It is calculated by dividing the maximum thickness by the maximum width (Th/B). This results in a value between 0 and 1, with the lower values expressing greater refinement.

2. Elongation. This expresses the relative length of a handaxe compared to its width. It is calculated by dividing the maximum width by the maximum length (B/L). This presents a value between 0 and 1, with the lower value expressing higher elongation (i.e. they are narrower).

3. Tip shape. This provides an index of the relative "pointedness" or "bluntness" of the tip of a handaxe (Roe 1968, 24). It is calculated using B1/B2, which provides a figure between 0 and 1, with lower values indicating that the tip is more pointed.

4. Cross sectional uniformity. This expresses the thickness of a handaxes tip relative to the thickness of its butt. It is calculated using T1/T2 and provides a value between 0 and 1, with higher values indicating more uniform cross sections.

5. Planform. This divides handaxes into three basic shapes based on the relative position of width. It is calculated by dividing the butt length by total length (L1/L). This results in a value between 0 and 1, with lower values expressing lower positions of maximum widths. Furthermore, these values provide a ratio of the position of the butt in relation to the tip, with low values indicative of a handaxe with a short butt and a long tip, and higher values showing handaxes with longer butts and short tips. Roe (1964, 1968) used

these measurements to divide handaxes into three broad groupings reflective of their planform:

(1) Points; L1/L not exceeding 0.350.

(2) Ovates; L1/Lvalue greater than 0.350.

(3) Cleavers; L1/L value greater than 0.550.

Following Roe (1964, 1968) the variation in the specific outline shape exhibited by these three groups can be illustrated through the mechanism of the tripartite diagram (see figure 3.3.9.2). This uses the planform, elongation and tip shape indices generated for individual handaxes to provide an illustration of the range of handaxe planforms present in an assemblage.

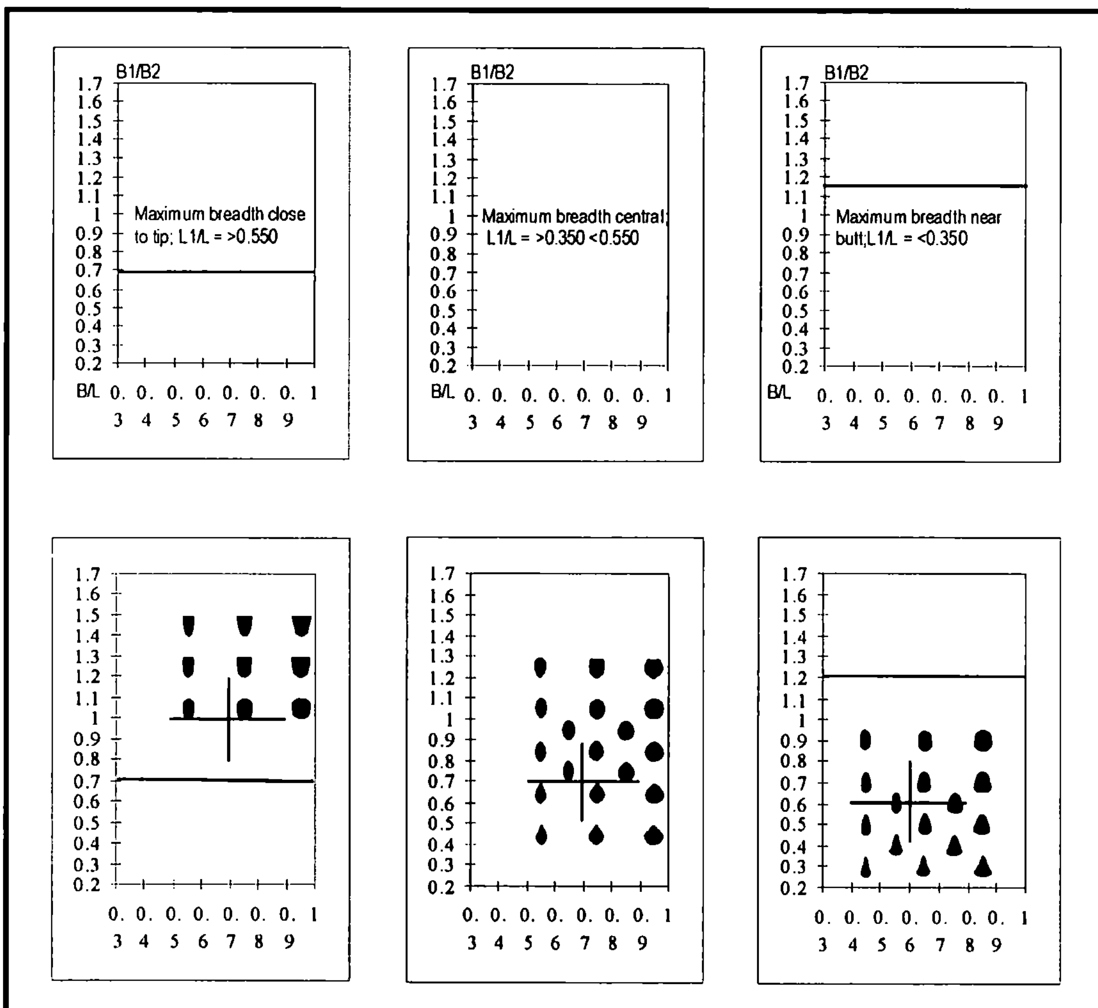

Figure 3.3.9.2 Key to the tripartite diagrams used throughout this thesis to illustrate the range in planform exhibited by the handaxes encountered amongst the assemblages selected for study (after Roe 1964, 1968).

Qualitative variables

1. Portion:

    1. Whole.

    2. Tip.
    3. Butt.
    4. Other Portion.

2. Measure (as a percentage) of the total surface area of the handaxe which displays evidence of cortex or retains other evidence of a natural surface.
    0. 0%.
    1. >0-25%.
    2. >25-50%.
    3. >50-75%.
    4. >75%.

3. For handaxes on flake blanks, this is a measure (as a percentage) of the total area of the piece which can be classed as displaying evidence of the original flake surface.
    0. 0%.
    1. >0-25%.
    2. >25-50%.
    3. >50-75%.
    4. >75%.

4. Position of cortex or natural surface:
    0. None.
    1. Butt only.
    2. Butt and edges.
    3. Edges only.
    4. On face.
    5. All over.

5. Evidence of blank dimensions. This observation refers to a handaxe retaining enough evidence of the proportions of the original blank to determine its width, thickness and/or maximum length (Ashton and McNabb 1994). The following categories are recorded:
    0. None.
    1. In one dimension.
    2. In two dimensions.

6. Blank type:
    1. Nodule.
    2. Flake.

3. Thermal/frost flake.
4. Shattered nodule.
5. Indeterminate.

7. Edge position. For this observation the handaxe was divided into three sectors: the butt, the tip and the edges. The butt is considered as the portion of the handaxe below B2, the tip the sector above B1, while the edges (or margins) equate to the three-fifths between these two points. The following categories are recognised:
    1. All round.
    2. All edges sharp, dull butt.
    3. Most edges sharp, dull butt.
    4. One sharp edge, dull butt.
    5. Irregular.
    6. Most edges sharp, sharp butt.
    7. One sharp edge, sharp butt.
    8. Tip only.

8. Edge section:
    1. Straight.
    2. Zigzag.
    3. Twisted.
    4. Mixed.

9. Butt working:
    0. Unworked.
    1. Partially worked.
    2. Fully worked.

10. Pattern of flaking:
    1. Fully alternate.
    2. One side then other.
    3. Unifacial.
    4. Alternate edges.

11 Presence of tranchet removal:
    1. Yes.
    2. No.

12 Edge(s) modified through retouch? The edges of handaxes were examined to assess whether they displayed evidence of being modified by retouch.

3.3.10 Retouched pieces

Following the terminology of Inizan *et al.* (1999) the distribution and nature of retouch was recorded for all modified pieces in order to assess whether any patterning was discernable as to how artefacts were retouched within or between the assemblages studied. Typological classifications are also given.

Qualitative variables

1. Position of retouch:
    1. Direct. Retouch is located on the dorsal face, or the surface with the greatest volume above the secant plane.
    2. Inverse. Retouch is located on the ventral face, or the surface with the least volume below the secant plane.
    3. Alternate. Retouch is located on the same edge of both faces.
    4. Bifacial. Retouch is directed into both faces from the same edge.
    5. Crossed. Retouch is directed into both faces to form a steep backed edge.

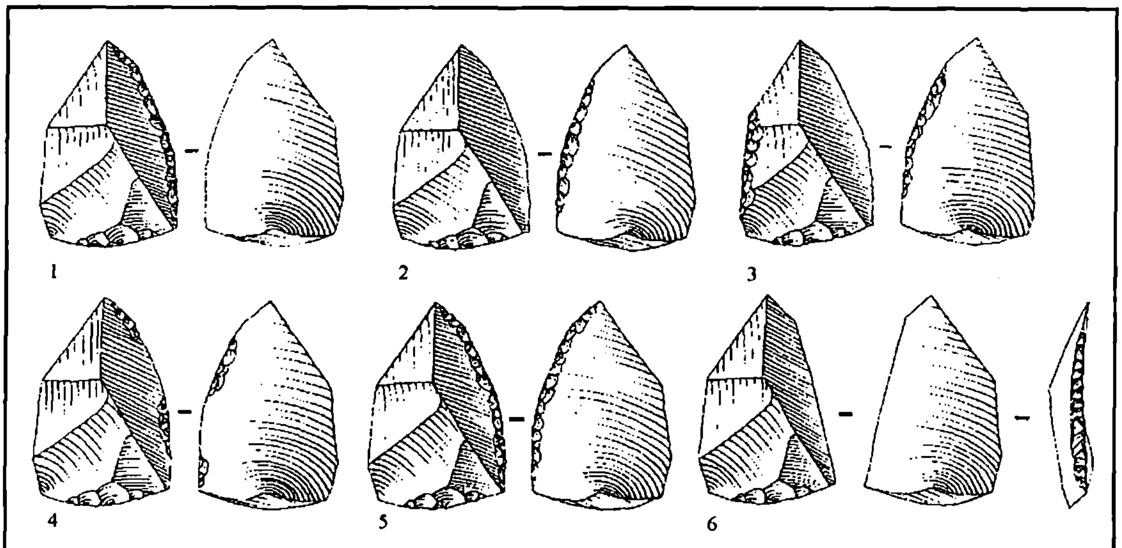

Figure 3.3.10.1 Position of retouch on flake tools: 1=direct, 2=inverse, 3=alternate, 4 & 5 = bifacial, 6=crossed (after Inizan et al. 1999).

2. Location of retouch:
    1. Proximal/butt.
    2. Distal/tip.
    3. One lateral edge.
    4. Both lateral edges.

5. Continuous except proximal edge/butt.
6. Continuous except other portion of edge (specified in notes).
7. Continuous.

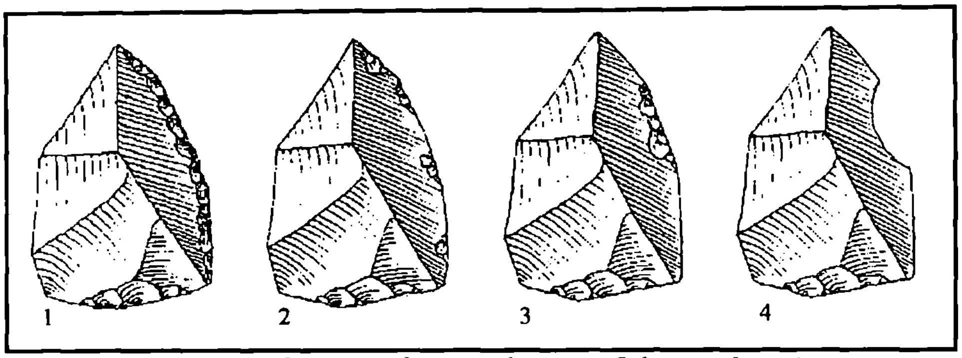

Figure 3.3.10.2 Distribution of retouch on flake tools: 1=continuous, 2=discontinuous, 3=partial, 4= isolated removal (modified from Inizan et al. 1999).

3. Distribution of retouch:
    1. Continuous.
    2. Discontinuous.
    3. Partial.
    4. Isolated removal.

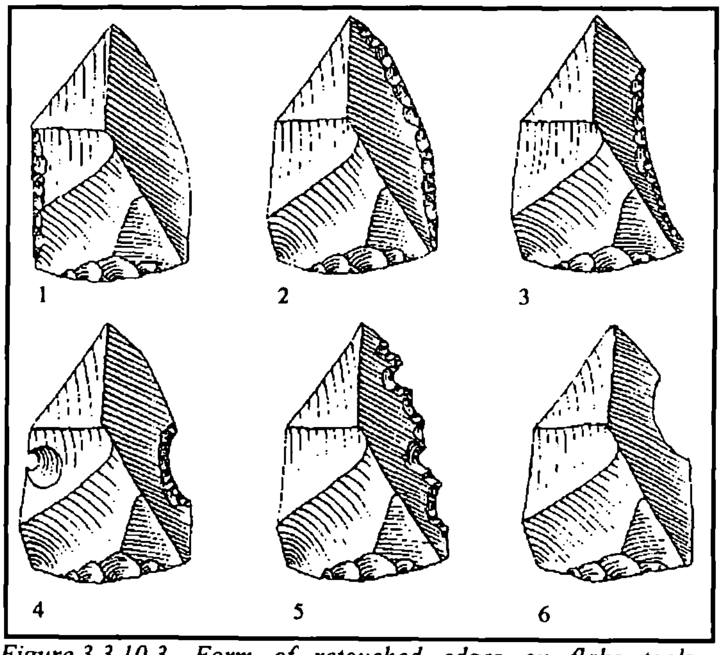

Figure 3.3.10.3 Form of retouched edges on flake tools: 1=rectilinear, 2=convex, 3=concave, 4=retouched notched, 5=denticulated, 6=flaked flake (modified from Inizan et al. 1999).

4. Form of retouched edge:
    1. Rectilinear.
    2. Convex.
    3. Concave.

4. Retouched notch.
5. Denticulate.
6. Flaked flake.

5. Extent of retouch:
    1. Marginal.
    2. Minimally invasive.
    3. Semi-invasive.
    4. Invasive.

6. Angle of retouch:
    1. Abrupt (approaching 90°).
    2. Semi-abrupt (~45°).
    3. Low (thinning).

7. Regularity of retouched edge:
    1. Regular.
    2. Irregular.
    3. Single removal.
    4. Obscured by damage that cuts across the retouch.

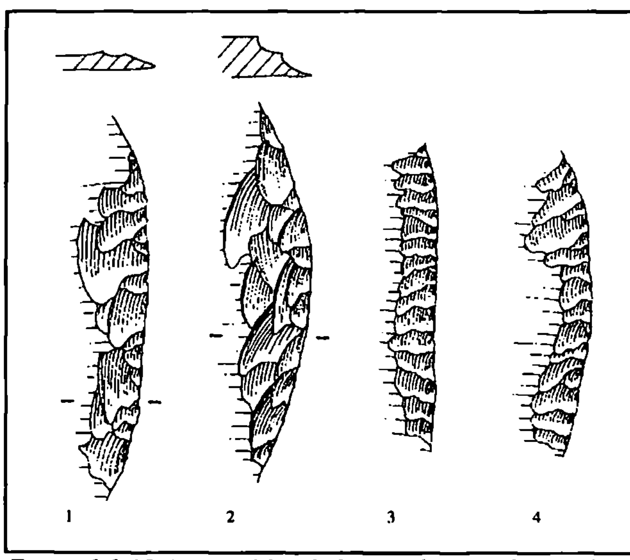

Figure 3.3.10.4 Morphology of retouch on flake tools. 1=scaly, 2=stepped, 3=parallel, 4=sub-parallel (after Inizan et al. 1999).

8. Morphology of retouch:
    1. Scaly.

2. Stepped.
3. Sub-Parallel.
4. Parallel.
5. Single removal.

9. Typological descriptions of flake tools are also given. These are mostly based on Bordes (1961). An exception to this are what are termed Nahr Ibrahim truncations. Following Chazan (2007a) these are classified as flakes which display abrupt retouch on their proximal and/or distal ends, which has subsequently been used as a platform(s) for the removal of flakes from their dorsal and/or ventral surface. Common at a number of Middle Palaeolithic sites in the Near East, these were first recognized by Schroeder (1969) on the basis of his work at Jerf Ajla, a cave site in central Syria, and later named by Solecki and Solecki (1970) after the site of Nahr Ibrahim in Lebanon. There is some debate regarding their function. Based on her work on the assemblages from Quneitra in the Golan Heights, Goren-Inbar (1988, 117) has suggested that these are actually small cores on flakes, not retouched tools at all. In contrast Chazan (2007a, 47) suggests that Nahr Ibrahim truncations may relate to a multifunctional method of tool resharpening, either to fabricate a "bit", a strong working tip, or even as an aid to hafting. Although none were encountered in this study, they are mentioned here as they are significant to wider discussions of Middle Palaeolithic technological variability in the Near East (see chapter ten).

Chapter 4

The Earlier Palaeolithic of the Orontes Valley – History of Research and Chronostratigraphic Framework

4. 1 Introduction

The river Orontes (or al-Aassi as it is called in Arabic) forms the main drainage system in the northern Levant. Although its source is located in the Beqaa Valley in Lebanon, much of the rivers course is located in Syria. From its headwaters in the anti-Lebanon mountains the river flows northwards across western Syria, passing through the cities of Homs and Hama, before reaching the sea near Antakya (Antioch) in the Hatay region (see figure 4.1.1). In north-western Syria the river flows through a low lying open landscape of Pliocene lacustrine marl outcrops before cutting a gorge through the chalky limestone plateau located between Rastan and Cheizar. After Cheizar the river breaks through an escarpment and flows through the lower lying Aacharne Plain before dropping into the Ghab, a linear valley which has formed along the Dead Sea Fault Zone which itself marks the northwards extension of the East African Rift. Prior to entering the Mediterranean the river flows westwards through the Amuq Plain in the Hatay region of Turkey where it has incised a ~300m deep gorge through the Amanos Mountains.

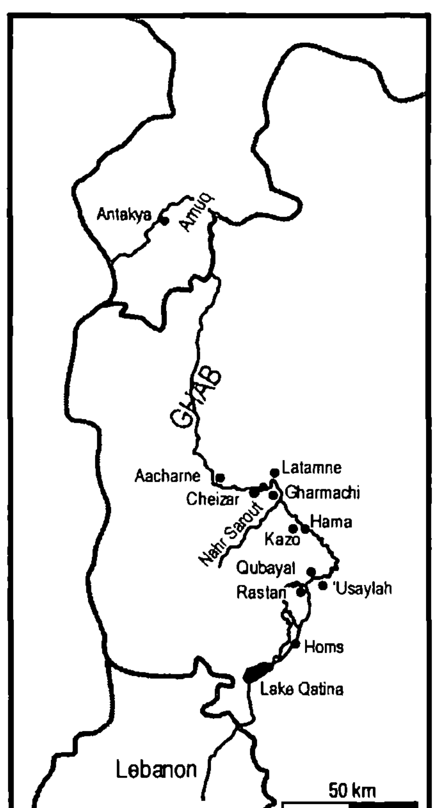

Figure 4.1.1 Map showing the full drainage of Orontes and the location of places referred to in chapter 4.

Notable quantities of earlier Palaeolithic artefacts have been recovered from the Orontes Valley, mostly in association with Pleistocene river terraces. However, although such deposits have been recorded along much of the length of the river, the vast majority of findspots are located together in the region between Homs and the Aacharne Plain. As a consequence, this research has focussed on material from this area. In this chapter the history of earlier Palaeolithic research in this area of the Orontes is discussed and the chrono-stratigraphic frameworks developed during these investigations are outlined.

4.2 History of Investigations

The first recorded discovery of Palaeolithic stone tools from the Orontes Valley was made in the early 1930s when an artefact assemblage containing handaxes was recovered from "old alluvium" located on the bank of the Orontes at Kazo, 6 km north of Hama (Burkhalter 1933, 584; see figure 4.1.1). The material was recovered by L. Burkhalter from deposits exposed in a road cutting and were reported in 1931 to the *Société Préhistorique de France* (Vaufrey 1931, 233). Subsequently, Burkhalter recovered further artefacts associated with Pleistocene deposits of the Orontes at locations ~5 km upstream and ~6 km downstream of Hama (Burkhalter 1933). For nearly 30 years these collections were to remain the only Palaeolithic artefacts known from the region.

In 1952, as part of engineering works carried out by the Netherlands Engineering Consultants to systematically drain the low lying marshy plains of the Ghab for agriculture, Caesar Voûte (1953; 1955) recorded Pleistocene fluvial deposits between Qubaybat and 'Usaylah (see figure 4.1.1). Although Voûte did not report any Palaeolithic archaeology associated with the deposits, this research marked the beginning of a period of sustained interest in the Pleistocene geology and archaeology of the region. Further research was instigated by Willem J. Van Liere, a Dutch pedologist working for the United Nations Food and Agricultural Organisation (F.A.O.), who carried out extensive field investigations into the Pleistocene geology of the whole of Syria. During the early 1960s, Van Liere reported the recovery of Palaeolithic artefacts from a number of localities. These included the discovery of an artefact assemblage and a mandible of the mammoth *Archidiskodon meridionalis* from gravel quarries located in the Sharia suburb of Hama (Van Liere and Hooijer 1962, Van Liere 1966, 16), and stone tools found in gravels exposed on both side of the river at Rastan (Van Liere 1966, 16). However, the most celebrated of the discoveries communicated by Van Liere came from fluvial deposits near the village of Latamne.

In 1960 Van Liere reported the recovery of faunal remains and stone tools from the floor of a quarry located south of the village of Latamne (Van Liere 1960). As a result of this discovery, two sondages were excavated close to the pit. These produced further artefacts and Pleistocene mammalian fossils (Van Liere 1960, Hooijer 1962). The interest created by these discoveries led P. J. R. Modderman to carry out a brief survey of Palaeolithic findspots around Hama (Modderman 1964). Further artefacts were recovered from quarries in the Sharia suburb of Hama, and small assemblages were obtained from field surfaces at nine other localities. In addition to this work, Modderman reopened and expanded one of Van Liere's sondages at Latamne. During the course of this research a concentration of seven handaxes was noted ~200 m west of the excavation. This led to the opening of a trial trench at this spot from which over 400 artefacts were recovered (Modderman 1964). As the majority of this material was in fresh condition, the locale has become known as the Latamne "Atelier" or "Living floor" site. Two further seasons of field research took place here under the direction of J. D. Clark. The research involved more excavations at the "Living floor" site (Clark 1966a; 1966b; 1967; 1968), as well as the study of the Pleistocene deposits found in the surrounding area (De Heinzelin 1966a; 1968a, Van Dusen Eggers 1966; 1968). After the 1965 investigations at Latamne, no further Palaeolithic research was carried out in the Orontes Valley for over ten years.

In October 1977 a survey of the Pleistocene geology and archaeology of a ~100 km stretch of the Orontes, between Rastan and the Aacharne Plain was instigated (Besançon *et al.* 1978a; 1978b, Besançon and Sanlaville 1993, Copeland and Hours 1993). Carried out under the auspices of French *Centre Nationale de la Rèchèrche Scientifique* (CNRS), the specific purpose of the project was to place the work previously undertaken at Latamne within a wider chronostratigraphic sequence (Besançon *et al.* 1978b, 149). In addition, the project formed part of a larger research programme entitled *L'homme et le milieu dans la region Levantine Quaternaire* which aimed to establish local chronologies in different ecological zones in the northern Levant (Besançon *et al.* 1978b, 169). The areas chosen were a littoral zone with a Mediterranean climate (the valley of the Nahr el-Kebir); an inland steppic zone (the valley of the Orontes) and a desert zone (the valley of the Euphrates; see chapter seven)

The CNRS team recovered over 4,000 artefacts from 69 locales in the Orontes Valley (Copeland and Hours 1993), associated with five chronologically distinct Pleistocene fluvial formations (Besançon and Sanlaville 1993). One of the sites identified (Gharmachi 1) was subsequently excavated by two of the project's members, Francis Hours and Sultan Muhesen (Hours 1979, Muhesen 1985; 1993). In 1988 Muhesen, along with two other team members (Jacques Besançon and Paul Sanlaville) returned briefly to the Orontes and recovered

Palaeolithic artefacts from two additional locales (Muhesen 1993). Besançon returned again in 1990, along with Pierre Mein, and recovered microfaunal samples from three localities, including the fluvial deposits at Latamne (Mein and Besançon 1993). During the same period (1990-1991) a Soviet-Syrian team recovered small artefact collections from two quarries at Latamne (Dodonov *et al.* 1993).

Recent years have seen only limited research into the Palaeolithic record of the Orontes Valley. Archaeological research within Syria as a whole has shifted to emphasise broad-scale multi-period landscape surveys, within which Palaeolithic remains are encountered. Within the Orontes, two such projects are ongoing; the Settlement and Landscape Development in the Homs Region survey (Philip *et al.* 2005) and the Orontes Survey (Bartl and al-Maqdissi, 2005). The Homs project is focussed on the area of the Orontes Valley located west and south of the city of Homs. Here, mapping has identified a previously unrecognised terrace staircase of the Orontes, comprising at least twelve separate terraces (Bridgland *et al.* 2003). Some Palaeolithic artefacts have been recovered from the surface of these terraces (Philip *et al.* 2005, 25). Work undertaken by the Orontes Survey has focussed on the stretch of the river located between Rastan and Cheizar. This research has also led to the recovery of Palaeolithic artefacts, most notably from the surfaces of river terraces located along the Nahr Sarout, a tributary of the Orontes (see figure 4.1.1).

4.3 Chrono-stratigraphic Framework

Voûte's work (see section 4.2) represented the first attempt to establish a chrono-stratigraphic framework for the Pleistocene fluvial deposits associated with earlier Palaeolithic findspots in the Orontes Valley. He observed three low lying river terraces, along with an unspecified number of higher terraces (Voûte 1955, 201). Subsequently, more terrace deposits were identified by Van Liere, who proposed a general sequence for the Quaternary formations of Syria in which five sequential Pleistocene geological units are recognised: Q I (early Pleistocene), Q IIa (early Middle Pleistocene), Q IIb (Middle Pleistocene) and Q IIIa and Q IIIb (both Upper Pleistocene) (Van Liere 1960-1961; 1966; see table 4.3.1).

In the Orontes Valley, Van Liere only identified deposits that he associated with his Q IIa and Q IIb phases. His Q IIa formation was represented by fluvial gravels exposed in road cuttings at Rastan (Van Liere 1966, 16) and in quarries located in the Sharia suburb of Hama (Van Liere and Hooijer 1962, Van Liere 1966, 16), while he equated the gravels found around Latamne to his Q IIb formation (Van Liere 1966, 17). These attributions were based on the typo-technological characteristics of the associated archaeology and, in the cases of Sharia and Latamne, the mammalian fauna assemblages recovered from the deposits.

			Orontes Quaternary Deposits				
	Age (MA)	Marine Isotope Stage	Van Liere (1966)	De Heinzelin (1966a; 1968a)	Besançon and Geyer (2003)	Sanlaville (2004)	Bridgland *et al.* (2003)
Holocene		1			Lower terrace (Qf 0)		
Upper Pleistocene	0.01	2		Mahrouka formation	Nahr Sarout 3 (Qf I)		Lower terrace (Qf 0)
	0.03	3					
	0.06	4			Tahounien / Nahr Sarout 2 (Qf I)		Nahr Sarout (Qf I)
	0.07	5					
Middle Pleistocene	0.13	6	Latamne formation (Q IIb)	Latamne formation	Emdanien / Nahr Sarout 1 (Qf I)		Jrabiyat formation (Qf II)
	0.19	7					
	0.24	8			Jrabiyat formation (Qf II)	Jrabiyat formation (Qf II)	
	0.30	9					
	0.33	10					
	0.37	11			Upper Latamne formation (Qf III)		Upper Lat. formation (Qf III)
	0.43	12				Upper Lat. formation (Qf III)	Lower Lat. formation (Qf III)
	0.48	13					
	0.53	14			Lower Lat. formation (Qf III)	Lower Lat. formation (Qf III)	
	0.57	15	Rastan/ Sharia (Q IIa)				Rastan / Khattab formation (Qf IV)
	0.62	16			Rastan	Rastan / Khattab (Qf IV)	
	0.66	>17			Khattab (Qf IV)		

Table 4.3.1 Chronostratigraphic frameworks proposed for Quaternary deposits in the Orontes Valley.

During the course of the excavations undertaken at Latamne (see section 4.2) Jean Michel De Heinzelin sought to situate the site within its wider geological context, through a study of the Pleistocene geology of the surrounding area (De Heinzelin 1966a; 1968a). He concluded that two Pleistocene deposits could be recognised - the Middle Pleistocene Latamne formation and the later Mahrouka formation (see table 4.3.1). The Latamne formation was noted to consist of a lower deposit of fluvial gravels, the base of which is ~35 m above the present Orontes, overlain by ~15 m of fluvial sands (De Heinzelin 1966a, 115; 1968a, 3). Below the Latamne formation, terraces of the Mahrouka formation were noted at ~25-30 m above the present river which De Heinzelin assigned to the Upper Pleistocene (De Heinzelin 1966a, 116; 1968a, 5).

By the end of the 1960s a Pleistocene fluvial sequence had emerged for the area of the Orontes between Rastan and Latamne which consisted of three terrace formations - an early Middle Pleistocene level, as represented by deposits exposed at Rastan and in the Sharia suburb of Hama; a Middle Pleistocene level, as represented by the Latamne formation; and a later level (believed to be Upper Pleistocene), referred to as the Mahrouka formation. However, the 1977 CNRS survey (see section 4.2) of the Pleistocene geology and archaeology of the Orontes Valley provided a new interpretation of the chronostratigraphy of these deposits (Besançon et al. 1978a; 1978b, Besançon and Sanlaville 1993).

As a result of extensive fieldwork carried out as part of the 1977 survey, Jacques Besançon and Paul Sanlaville provided a relative chronology for the Pleistocene deposits found between Rastan and Aacharne (see table 4.3.1). Based on the geomorphological, sedimentological and geological characteristics of the deposits (Besançon and Sanlaville 1993, 21), five chronologically distinct Quaternary fluvial (or Qf) formations were recognised. These ranged from Qf IV, the oldest, to Qf 0, regarded as Holocene (Besançon and Sanlaville 1993). The Qf IV, or the Khattab formation, represented a previously unrecognised fluvial unit thought to predate the Latamne formation (or Qf III as it is referred to in Besançon and Sanlaville's sequence). In contrast to Van Liere (see above), Besançon and Sanlaville suggested that fluvial gravels found in the Sharia suburb of Hama were equivalent in date to Latamne deposits, not older (Besançon and Sanlaville 1993, 21). Originally, the same conclusion was reached regarding the Rastan gravels (Besançon and Sanlaville 1993, 21), but in later publications (Besançon and Geyer 2003, 56, Sanlaville 2004, 123) these deposits are considered to pre-date those at Latamne.

The deposits attributed by Besançon and Sanlaville to their Qf II, or Jrabiyat formation, constituted a second previously unrecognised Middle Pleistocene terrace formation, argued to be younger than the Latamne formation on the basis of altitude (Besançon and Sanlaville 1993, 27). Futhermore, the authors equated the Mahrouka formation found in the Latamne area with the Jrabiyat formation (Besançon and Sanlaville 1993, 28). The youngest Pleistocene deposits identified by Besançon and Sanlaville were those associated with the Qf I or Sarout formation. This formation is complex and frequently heavily eroded, comprising at least two distinct facies - fluvial sands and gravel (Emdanien), along with an argillaceous alluvium (Tahounien). Although originally regarded as being of broadly the same date (Besançon and Sanlaville 1993, 24), these two facies have since been classified as chronologically distinct (Besançon and Geyer 2003, 56).

The research carried out by Besançon and Sanlaville formed part of a wider programme of study of the Pleistocene geology and archaeology of Syria (see section 4.2). As a result, their chronostratigraphic sequence for the Pleistocene fluvial deposits of the Orontes was repeatedly modified, formations (in particularly those belonging to the Qf I formation) being split in order to iron out anomalies and to accommodate the sequence within the Marine Isotope Stage (MIS) curve. The sequence outlined in table 4.3.1 is based on their most recent interpretations (Besançon and Geyer 2003, 56, Sanlaville 2004, 123).

The latest contribution to the chronostratigraphy of the Pleistocene fluvial sequence of the Orontes Valley was undertaken as part of the Homs Region survey (see section 4.2). A previously unrecognised fluvial sequence was identified south and east of Lake Qatina (see figure 4. 1. 1), on the east bank of the Orontes (Bridgland *et al.* 2003). Conglomerates had previously been noted in this area, but were then interpreted as fan gravels (Van Liere 1960-1961, 29). However, the Homs survey has established that these cemented gravels are actually fluvial in origin, as they occupy channels and are interbedded with finer material (Bridgland *et al.* 2003, 1081).

Mapping of these conglomerates revealed a staircase of at least 12 terraces rising from >650 m a.s.l. to river level at 480-510 m a.s.l., and spread over a distance of ~15 km (Bridgland *et al.* 2003). These terraces are correlated with the Pleistocene fluvial deposits downstream between Rastan and Aacharne on the basis of altitude (Bridgland *et al.* 2003 1084). Underlying this correlation is the assertion that terrace formation in both these areas is a response to localised deformation of the earth's crust, resulting in regional uplift and consequent down-cutting by rivers (Bridgland *et al.* 2003, 1084). In temperate regions terrace formation seems to be intimately connected to climatic cycling - rivers downcut in periods of increased discharge (late glacial/early interglacial), whilst terraces aggrade during the subsequent warming interval, as well as during the cooling limb of an interglacial (Bridgland 2000).

The contribution of climatic factors to terrace formation in Mediterranean regions is as yet poorly understood; however, it has been suggested that the alternation of marine and fluvial terraces around Latakia in north-western Syria indicates that fluvial terraces did not form during interglacials, when sea levels were highest, and therefore that a degree of climatic synchrony is apparent (Bridgland *et al.* 2003, 1085).

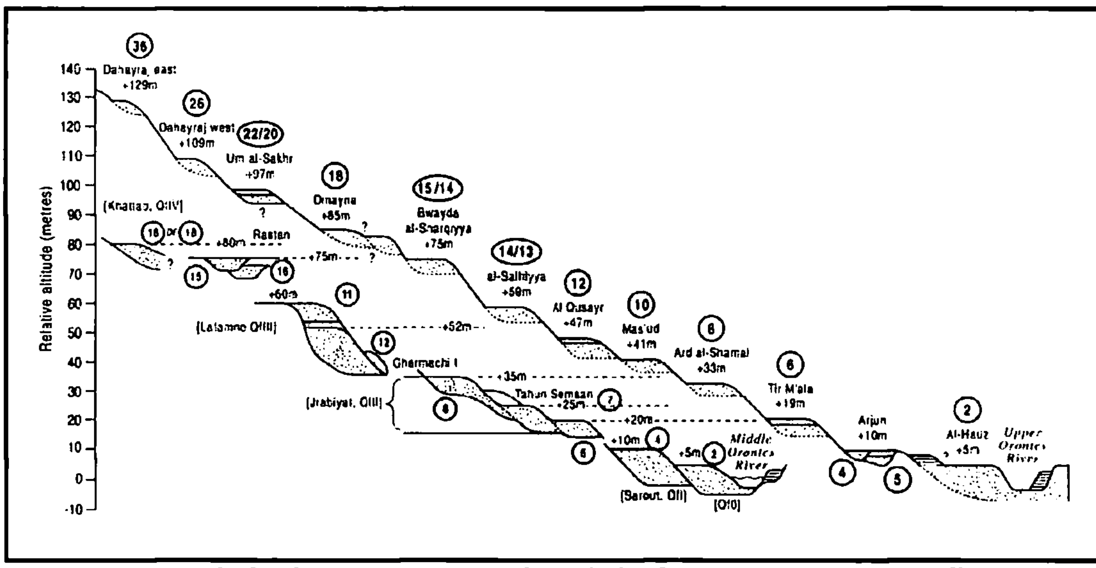

Figure 4.3.1 Idealised transverse section through the Orontes terraces in Syria illustrating MIS correlations proposed by Bridgland et al. (after Bridgland et al. 2003).

The recent work around Homs has also proposed a correlation of the Orontes terraces in this area, and those downstream between Rastan and Aacharne, with the Marine Isotope curve (see figure 4.3.1). These correlations are based upon age estimates for the Latamne formation, which are grounded in mammalian biostratigraphy. Bridgland *et al.* (2003) have suggested that the lower fluvial units found at Latamne most probably began to aggrade in either MIS 13 or MIS 12, since the associated faunal assemblage combines species of Mammoth and Giant Deer (*Mammuthus trogontherii* and *Megaloceros verticornis*) unknown in Europe after MIS 12, together with a rhinoceros (*Stephanorhinus hemitoechus*), the first Europe appearance of which dates to MIS 11. On this basis, it is therefore suggested that the most likely MIS correlation for the Latamne formation is MIS 12/11 or MIS 13/12 (Bridgland *et al* 2003, 1084), although an MIS 12/11 date is currently preferred (David Bridgland personal communication 2007). Using this chronostratigraphic framework, it is now possible to advance tentative MIS attributions for many archaeologically productive fluvial deposits in the Orontes Valley (see figure 4.3.1); the manner in which an age attribution has been assigned to any particular site is discussed in the relevant section of the two subsequent chapters.

Chapter 5
The Earlier Palaeolithic of the Orontes Valley – Lower Palaeolithic Sites

5.1 Introduction

The material analysed in this chapter comprises assemblages from the Orontes Valley that are considered to be Lower Palaeolithic in date. The attribution of these assemblages to the Lower Palaeolithic follows the criteria outlined in chapter 3; all were recovered from deposits thought to broadly date to MIS 8 or earlier, and do not contain any unambiguous Levallois material. Due to the historical focus of earlier Palaeolithic research on the stretch of Orontes between Rastan and Aacharne (see chapter four), all the sites considered are from the same broad geographic area (see figure 5.1.1).

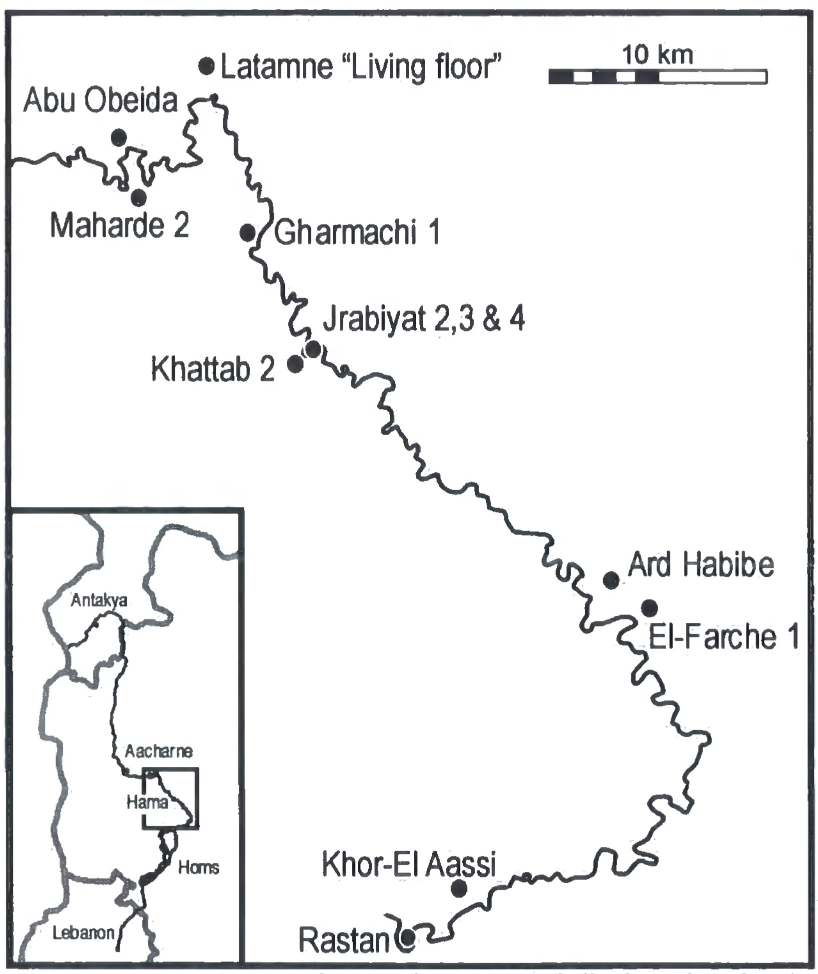

Figure 5.1.1 Location map showing the position of all sites referred to in chapter 5.

Twelve collections were analysed, although six consist of just a handful of pieces. These are all from fluvial deposits assigned to the Khattab formation and have been included as they have been argued to represent the earliest evidence for a human presence in the Orontes

Valley. The remaining six collections consist of larger artefact collections: two (Latamne "Living floor" and Gharmachi 1) contain relatively undisturbed artefact accumulations which give an insight into hominin technological decision making and landscape-use at particular places in the Orontes Valley, whilst the other four (Rastan, Jrabiyat 2, 3 and 4) largely consist of fluvially derived artefacts which only allow for the investigation of hominin behaviour over an extended period of time in a wide landscape catchment.

Discussion of the material from the selected sites includes consideration of their chronostratigraphic, geographic and (where possible) environmental context, as well as their likely date, and any potential uncertainties surrounding their age. A detailed taphonomic and technological study of each site is provided. However, due to differences in recovery practices and the level of post-depositional disturbance each collection has undergone, different scales of analysis were considered appropriate for some assemblages. In certain cases this has meant that although each collection was originally analysed separately, taphonomic factors have meant that they are presented here together. The nature of, and reasoning behind, the approach adopted to deal with an individual assemblage is outlined in each section. On the basis of this analysis an interpretation of the technological decision making and hominin behaviour associated with each collection is presented. These are subsequently drawn together (section 5.7) to provide an assessment of Lower Palaeolithic settlement history, technological practices and landscape-use in the Orontes Valley.

5.2 Khattab Formation Sites

The earliest Palaeolithic "artefact" occurrences recovered from the Orontes Valley are those associated with the Khattab formation, which is variously dated to MIS 18 or MIS 16 (figure 5 in Bridgland *et al.* 2003), MIS 16 (Sanlaville 2004, 56) or to before MIS 17 (Besançon and Geyer 2003, 123). Six locales at which the Khattab formation has been examined are said to have produced small artefact samples (Copeland and Hours 1993, 67); Abu Obeida, Maharde 2, Khattab 2, Ard Habibe, El-Farche 1 and Khor-El Aassi (see figure 5.1.1). However, examination of the extant artefact collections from these localities housed in the National Museum, Damascus did not identify any artefacts from these sites which were unequivocally of human manufacture.

5.3 Rastan

Location & History of Investigation

The town of Rastan is located approximately half-way between the cities of Homs and Hama, and overlooks a point where the River Orontes has been laterally constricted by basalt flows, forming a deep gorge (see figure 5.1.1). A number of flakes were recovered from here by W. J. Van Liere in the early 1960s (see chapter four, section 4.2). The exact point from which they were collected is, however, unclear; the fact that Van Liere states that the artefacts came from gravels exposed in road cuttings on "both sides of the valley" (Van Liere 1966, 16), suggests that they may have come from more than one exposure. Van Liere's brief description of the position of these exposures suggests they were located in two cuttings dug during the construction of the road which crosses the dam at Rastan (see figure 5.3.1); these still survive.

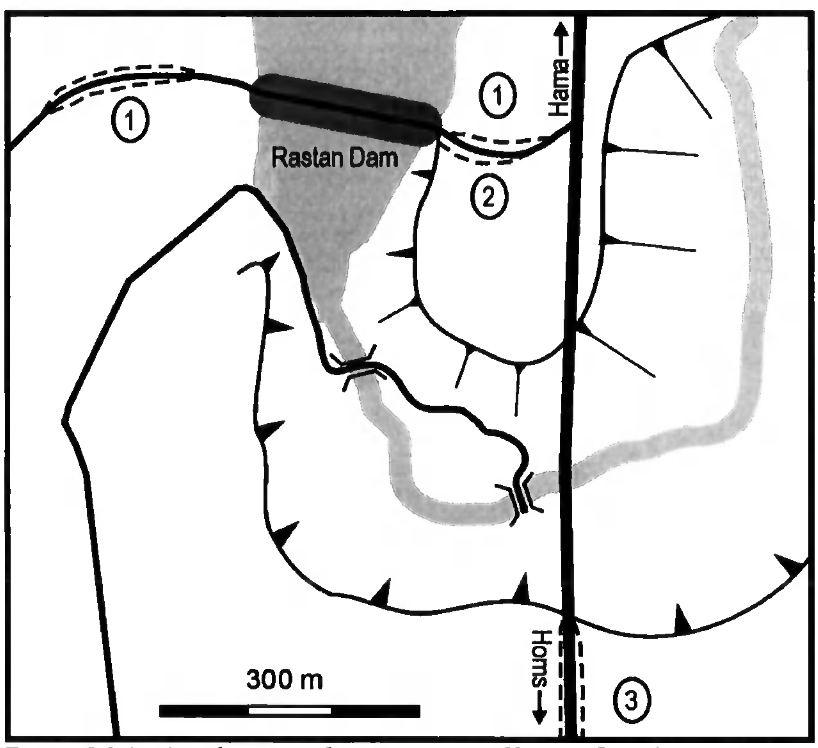

Figure 5.3.1 Map showing relative position of known fluvial exposures in the Rastan area:

1. *Probable location of sections examined by Van Liere (1966).*
2. *Location of sections examined by CNRS survey (Besançon & Sanlaville, 1993, Copeland and Hours 1993).*
3. *Location of sections examined by Bridgland et al. (2003).*

The 1977 CNRS survey (see chapter four, section 4.2) also recovered artefacts from Pleistocene fluvial deposits at Rastan. A total of 153 flakes and cores were recovered from two sections through gravels located on either side of a road cutting (Copeland & Hours 1993, 75). This road cutting is in the same area as one of those thought to have been examined by Van Liere (see figure 5.3.1). Recent research carried out as part of the Homs Regional Survey (see chapter four, section 4.2) identified further exposures of fluvial deposits at Rastan in superimposed channel fills located on both sides of a motorway cutting (Bridgland *et al.* 2003, 1083; see figure 5.3.1). During the course of three visits to these exposures lasting several hours no definite artefacts were identified (personal observation).

Geological Background & Preferred Dating

Previous researchers have suggested that the fluvial deposits examined by Van Liere at Rastan are the same as those examined by the CNRS survey (Besançon & Sanlaville, 1993, 29). The fact that some of Van Liere's exposures examined appear to be in the same area as those visited by the CNRS survey team lends some credence to this suggestion. However, whereas Van Liere (1966, 16) states that the deposits which he examined were located ~70 m above the modern Orontes, those identified by CNRS survey are said to have been located only ~50 m above the river (Besançon & Sanlaville, 1993, 29). Furthermore, while Van Liere refers to the deposits as "a relatively thin bed of gravel," those examined by the CNRS survey are described as being exposed in a cutting incised "deeply through fluviatile deposits" (Copeland and Hour 1993, 75).

One possible explanation is that although Van Liere and the CNRS survey did examine some of the same deposits, Van Liere also examined an unknown number of exposures located on both sides of the river valley. This could mean that the figure of ~70 m actually refers to deposits located some distance away from those examined by the CNRS team. Alternatively, it could be that Van Liere's exposures are all located ~70 m above the Orontes and that those examined by the CNRS survey were not visited by Van Liere, although they did both visit exposures in the same general area. Support for this latter suggestion is provided by the fact that those examined by the CNRS survey were in an area of ongoing disturbance (L. Copeland pers. com. 2007), suggesting that they may have been exposed long after Van Liere's work at Rastan. Regardless of whether either explanation is correct, it appears that fluvial deposits at varying heights may have been identified by Van Liere and the CNRS survey, some at ~70 m, and others at ~50 m, above the Orontes. This also raises the possibility that more than one terrace level may be present in this area. In addition, the fluvial deposits recently recorded by Bridgland *et al.* (2003) represent a separate phase of terrace formation in the Rastan area, as they are located ~90 m above the modern Orontes.

Since terrace deposits have been identified at widely divergent heights, it seems that several phases of downcutting and river terrace formation can be identified in the Rastan region. Unfortunately, however, only tentative age ranges can be assigned to these deposits.

Although located ~90 m above the modern Orontes, Bridgland *et al.* (2003, 1083) suggest that the deposits they identified should be correlated with terraces ~75 m above the equilibrium height of the modern river. This suggestion is based on the observation that the river profile at Rastan has a major nick point, having only recently incised through the base of basalt flows found in this area. They argue that this has resulted in a local ~15 m difference in terrace height, placing the gravels they identified at ~+75 m relative to an equilibrium river profile (see figure 4.3.1, chapter four, section 4.3). Furthermore, they suggest that these deposits can be correlated with the Khattab formation gravels, which they argue accumulated during MIS 16/15 (Bridgland *et al.* 2003, figure 5). This may be significant as, in spite of several investigations, no definite artefacts have been recovered from these gravels found at Rastan, whilst this study also failed to identify any definite artefacts amongst the extant collections from the sites associated with the Khattab formation (see section 5.2).

In their most recent publications, members of the CNRS survey team have suggested that the gravels they identified at Rastan can be tentatively assigned to MIS 16 (Besançon and Geyer 2003, 123, Sanlaville 2004, 56) which would make them broadly contemporary with those identified by Bridgland *et al.* (2003). However, as they are located ~40 m below the latter this suggestion seems untenable. Originally, the same authors suggested that the deposits they identified were in fact broadly contemporary with those found downstream at Latamne (Besançon and Sanlaville 1993, 29). This may in fact be the case, as the Latamne deposits are located between ~35 m and ~65 m above equilibrium river level (see section 5.4), whilst the Rastan deposits are ~50 m which, taking into account ~15 m local difference in terrace height suggested by Bridgland *et al.* (2003), equates to a reduced figure of ~35 m above the modern river. As the Latamne deposits are thought to have accumulated during MIS 12/11 (see section 5.4), it is suggested here that the artefact bearing deposits identified by the CNRS team at Rastan post-date MIS 16, but were deposited at sometime during, or before MIS 11. Based on their relative height, those identified by Van Liere are also likely to have been deposited after MIS 16, although they may have been deposited during a slightly earlier interval than the CNRS deposits.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

The material analysed in this study consists of that collected from two gravel exposures by the CNRS survey team, since these are the most stratigraphically secure collections from the region (see above). These artefacts are stored in the National Museum, Damascus and are labelled to site and, frequently, to individual section. A total of 132 artefacts, 76 of which are flakes and 56 cores, were identified (table 5.3.1). No handaxes were found amongst the material (the "crude pebble tool (a pick?)" recorded by Copeland and Hours (1993, 75) is interpreted here as a core). Due to the relatively small sample size, and the fact that the material was recovered from an unspecified depth from two sections on opposite sides of a single road cutting, all the artefacts are considered here as a single assemblage.

	Rastan	
	No. of artefacts	**% of total**
Cores	56	42.4%
Handaxes	0	0.0%
Flakes	76	57.6%
Flake tools	0	0.0%
Total	132	100%

Table 5.3.1 Material analysed from Rastan.

Taphonomy of lithic assemblage

Cores from Rastan (n=56)					
Unabraded	8	14.3%	*No edge damage*	0	0.0%
Slightly abraded	9	16.1%	*Slight edge damage*	10	17.9%
Moderately abraded	16	28.6%	*Moderate edge damage*	41	73.2%
Heavily abraded	23	41.1%	*Heavy edge damage*	5	8.9%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	0	0.0%	*Lightly patinated*	0	0.0%
Moderately stained	6	10.7%	*Moderately patinated*	33	58.9%
Heavily stained	50	89.3%	*Heavily patinated*	23	41.1%
No battering	35	62.5%			
Light battering	13	23.2%			
Moderate battering	8	14.3%			
Heavy battering	0	0.0%			

Table 5.3.2 Condition of all cores from Rastan.

Flakes from Rastan (n=76)					
Unabraded	4	5.3%	*No edge damage*	0	0.0%
Slightly abraded	18	23.7%	*Slight edge damage*	8	10.5%
Moderately abraded	17	22.4%	*Moderate edge damage*	30	39.5%
Heavily abraded	37	48.7%	*Heavy edge damage*	38	50.0%
Unstained	1	1.3%	*Unpatinated*	0	0.0%
Lightly stained	2	2.6%	*Lightly patinated*	2	2.6%
Moderately stained	6	7.9%	*Moderately patinated*	65	85.5%
Heavily stained	67	88.2%	*Heavily patinated*	9	11.8%
No battering	29	38.2%			
Light battering	28	36.8%			
Moderate battering	19	25.0%			
Heavy battering	0	0.0%			

Table 5.3.3 Condition of all flakes from Rastan.

The condition of the artefacts from Rastan reflects the physical processes undergone by the assemblage as a whole (tables 5.3.2 and 5.3.3). Most artefacts are heavily stained (88.6%) and at least moderately patinated (74.2%) and the majority are at least moderately abraded (70.5%), many heavily so (45.5%). This indicates that a large part of the assemblage has been subject to significant fluvial transport. Additionally, 37.5% of the artefacts display some sign of battering (incipient cones on humanly flaked surfaces), indicative of clast collision occasioned by fluvial transport, while 86.4% of the artefacts display at least a moderate degree of edge damage, potentially suggestive of fluvial displacement. The flakes, on the whole, have suffered heavier edge damage than the cores (50.0% and 8.9% respectively); this probably reflects the fact that flakes tend to be thinner and possess edges which are more easily damaged.

Despite the abundant evidence that much of the Rastan assemblage has been fluvially re-worked, a number of artefacts are unabraded (9.1%), or only slightly so (20.5%). As such, it seems that a small proportion of the Rastan assemblage was not significantly re-worked. The collection studied is therefore likely to consist of two separate assemblages; a larger, extensively displaced assemblage and a smaller, minimally re-worked assemblage, which is likely to be broadly contemporary with the gravels. Unfortunately, the small sample size precludes assessment of the degree of rearrangement undergone by the fresher artefacts, nor is it possible to speculate as to where they came from within the Rastan fluvial deposits. However, they are likely to derive from a stable surface within the gravels, or from the surface of the gravels subsequent to the main phase of deposition.

Technology of lithic assemblage

Raw Material

	Cores (n=17)	Flakes (n=22)
Fresh	0.0%	0.0%
Derived	88.2%	81.8%
Indeterminate	11.8%	18.2%

Table 5.3.4 Source of raw material exploited to produce artefacts from Rastan (unabraded and slightly abraded artefacts only).

All the artefacts from Rastan are on coarse-grained chert/flint of the type found locally within the gravels (personal observation). Due to the post-depositional fluvial abrasion suffered by the majority of artefacts in the collection it is only possible to suggest the source of the raw material for the limited number of artefacts in an unabraded or only slightly abraded condition (table 5.3.4). Of these artefacts, 11.8% of the cores and 18.2% of the flakes do not retain any cortex, while the cortex on the remaining material is abraded. This indicates that the raw material source for these artefacts is fluvial gravels such as those found at the site.

Core Working

As fresher artefacts are clearly present amongst the more heavily re-worked material recovered from Rastan, the cores from the site were divided according to condition prior to analysis. However, as no technological differences were apparent between the groupings, their attributes are presented together here (tables 5.3.5 and 5.3.6).

	Maximum dimensions (mm)	**Weight (grams)**
Mean	62.1	171.9
Median	56.8	123
Min	30.2	15
Max	120.7	915
St.Dev.	20.0	180.8

Table 5.3.5 Rastan cores summary statistics (n=53, fragments excluded).

Cores; technological observations (n=56)					
Overall core reduction (n=56)			Core episodes (n=105)		
Migrating platform	42	75.0 %	*Type A: Single Removal*	10	9.5%
Single platform unprepared	11	19.6 %	*Type B: Parallel flaking*	27	25.7%
Fragment	3	5.4%	*Type C: Alternate flaking*	47	44.8%
			Type D: Unattributed removal	21	20.0%
Flake scars/core (n=53)			Core episodes/core		
1-5	24	45.3%	*Min*	1	-
6-10	25	47.2%	*Max*	5	-
>10	4	7.5%	*Mean*	1.9	-
Max	11	-			
Mean	5.8	-			
Flake scars/core episode			Blank form retained? (n=53)		
Min	1	-	*Yes*	49	92.5%
Max	9	-	*No*	4	7.5%
Mean	3.1	-			
% Cortex (n=53)			Blank type (n=56)		
0	0	0.0%	*Nodule*	53	94.6%
>0-25%	0	0.0%	*Shattered block*	0	0.0%
>25-50%	17	32.1%	*Flake*	1	1.8%
>50-75%	28	52.8%	*Thermal flake*	0	0.0%
>75%	8	15.1%	*Indeterminate*	2	3.6%

Table 5.3.6 Technological observations for cores from Rastan.

The majority (75.0%) of cores from Rastan can be described as migrating platform cores as they exhibit evidence of the *ad hoc* exploitation of particular platforms as they become available throughout reduction. The remaining examples are all cores worked from a single, unprepared platform. On the whole, the cores from Rastan tend to be small in size, with a mean maximum dimension of 62.1 mm and an average weight of 171.9 grams. Reduction seems to have been limited and commonly involved episodes of alternate flaking; 92.5% of the cores possess 10 or fewer flake scars, whilst approximately half of these retain evidence of 5 or fewer removals. The number of core episodes also tends to be small (mean = 1.9), whilst the fact that on average each of these episodes consisted of just 3.1 removals also suggests that reduction was not deliberately prolonged. As a result of their limited working, all the Rastan cores retain cortex on at least 25% of their surface area. Consequently, the original form of the blank can be determined for most cores (92.5%); for 94.6% of the cores this was a nodule.

The technological attributes of the Rastan cores suggest that blank size was the major factor influencing reduction. It appears that the small size of the available raw material imposed severe limitations on the knapper and that only a limited number of flakes could be removed from an individual nodule before it became miniaturised and too small to easily handle. As a consequence, core working at Rastan involved simple alternate knapping sequences of restricted duration.

Flakes

As with the cores, the flakes from Rastan were divided according to condition prior to analysis. However, as no technological differences were apparent between the groupings, their attributes are presented together here (tables 5.3.7 and 5.3.8).

	Maximum length (mm)	**Maximum breadth (mm)**	**Maximum thickness (mm)**
Mean	40.8	36.3	14.7
Median	39.4	33.7	13.9
Min	19.5	16.0	6.6
Max	83.5	77.7	29.3
St.Dev.	12.5	10.8	5.2

Table 5.3.7 Rastan flakes summary statistics (n=66, fragments excluded).

Technological observations relating to the flakes from Rastan suggests that they were produced using the same strategy employed in the reduction of the cores collected from the site. They tend to be small in size (see table 5.3.7) and display no evidence of platform preparation. All are the product of hard hammer reduction (table 5.3.8). Like the cores, the flakes suggest a reduction strategy of limited intensity, resulting in a low number of dorsal scars (only 7.6% retain evidence of more than 3 removals) and high cortex retention (42.4% retain cortex on more than 50% of their dorsal surface). This may, however, relate to collection bias. In addition, the flakes tend to possess an uncomplicated dorsal scar pattern

(57.6% possess a uni-directional dorsal scar pattern) and few retain relict core edges (11.8%). This suggests that the reduction strategies employed by the Rastan knappers involved few core episodes and a limited number of platform changes.

Flakes; technological observations (n=76)					
Portion (n=76)			Dorsal scars (n=66)		
Whole	66	86.8%	0	14	21.2%
Proximal	3	4.0%	1	19	28.8%
Distal	7	9.2%	2	11	16.7%
Mesial	0	0.0%	3	15	22.7%
Siret	0	0.0%	4	3	4.6%
			5	2	3.0%
			>5	0	0.0%
			Obscured	2	3.0%
Dorsal cortex retention (n=66)			Dorsal scar pattern (n=66)		
100%	14	21.2%	*Uni-directional*	38	57.6%
>50%	14	21.2%	*Bi-directional*	3	4.6%
<50%	25	37.9%	*Multi-directional*	9	13.6%
0%	11	16.7%	*Wholly cortical*	14	21.2%
Obscured	2	3.0%	*Obscured*	2	3.0%
Butt type (n=76)			Hammer mode (n=76)		
Plain	34	44.7%	*Hard*	76	100%
Dihedral	1	1.3%	*Soft*	0	0.0%
Cortical	12	15.8%	*Indeterminate*	0	0.0%
Natural (but non-cortical)	3	4.0%			
Marginal	1	1.3%	Relict core edge(s) (n=76)		
Mixed	1	1.3%	*Yes*	9	11.8%
Obscured	17	22.4%	*No*	67	88.2%
Missing	7	9.2%			

Table 5.3.8 Technological observations for flakes from Rastan.

Retouched Tools

No retouched artefacts were identified amongst the material studied from Rastan.

Technology and Hominin Behaviour

The artefacts studied from Rastan form two assemblages that can be separated according to their physical condition; one is fluvially abraded, whilst the other is relatively fresh. The former is at least as old as the gravels found at the site, whilst the latter is likely to be broadly contemporary. These are thought to have been lain down after MIS 16, but before MIS 11. Notably, the technological data from both the relatively fresh and more re-worked assemblages from the Rastan gravels provides a remarkably consistent picture. Both assemblages comprise simply worked cores and flakes, and both lack any evidence for handaxe production. The vast majority of the Rastan artefacts were produced on small derived chert/flint clasts. It appears that the nature of this raw material placed severe restrictions on the knapper, and that in order to produce usable flakes a curtailed knapping strategy was adopted. The fact that this raw material severely limits reduction options potentially accounts for the similarity between the derived and less derived assemblage from the site.

Despite the small size of the Rastan assemblage it is possible to argue that raw material considerations explain the apparent lack of evidence for handaxe production. This is not to say that when more malleable raw material was available the hominins who produced the Rastan artefacts did not also produce handaxes. At the site itself, as well as further upstream, there is no accessible bedrock source of chert/flint. These have been covered by marls and gravels deposited during the Eocene and Pliocene (Ponikarov *et al.* 1966; 1967), as well as the Homs basalt flow, which results from a volcanic eruption which occurred during the late Miocene (Mouty *et al.* 1992, Butler and Spencer 1999). Consequently, the only siliceous raw material available in the vicinity of, and upstream from, Rastan is derived chert/flint pebbles from secondary sources. Because of their small size, these nodules do not lend themselves to handaxe production (*cf.* Copeland and Hours 1993, 88). Rather, simple core working was favoured in order to produce flakes, and knapping strategies of limited intensity were followed to prevent products becoming too small to handle.

5.4 Latamne "Living floor" Site

Location & History of Investigation

The village of Latamne is located ~39 km north of the city of Hama at a point where the main valley of the Orontes is joined by a tributary, the Wadi al-Assal (see figure 5.1.1). At this point the river has incised some ~60 m into Upper Cretaceous Chalk and chalky limestone, which forms the local bedrock (Clark 1966a, 31; 1967, 1). Along the banks of the Wadi al-Assal an extensive Pleistocene fluvial sequence is preserved, which includes the Latamne "Living floor" deposits.

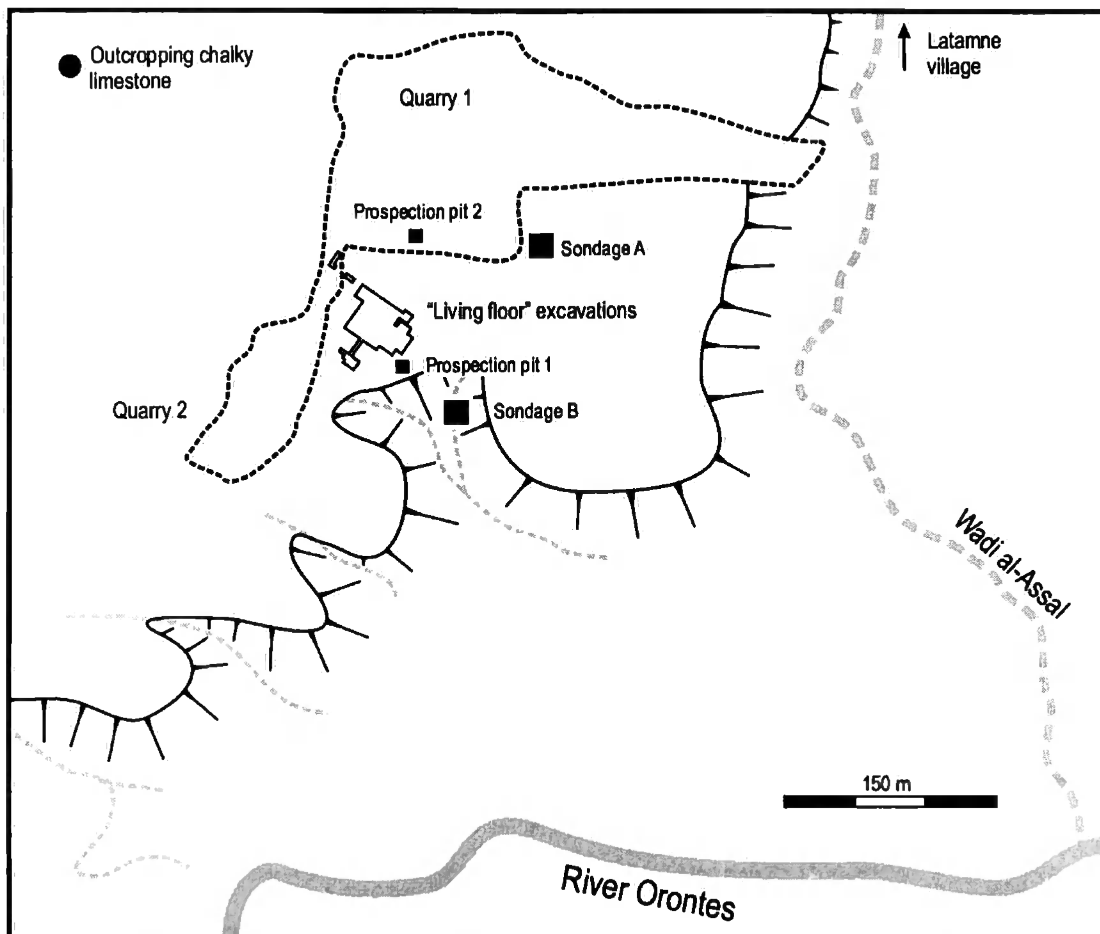

Figure 5.4.1 Location map illustrating current extent of quarrying and position of excavations in the vicinity of the Latamne "Living floor" site.

The first recorded discovery of Palaeolithic artefacts from Latamne occurred in 1960. In that year, W. J. Van Liere reported the recovery of faunal remains and stone tools from the floor of a gravel quarry (henceforth Latamne Quarry 1) opened in 1959, located ~1.5 km south of Latamne village (Van Liere 1960, 165; see figure 5.4.1). In order to investigate the gravels from which the artefacts and fauna were presumed to have come, Van Liere and A. Bouoni (Director of Excavations at the National Museum, Damascus) excavated two sondages in the vicinity of Latamne Quarry 1 (Van Liere 1960, 165; 1966, 19). These excavations were located in a wadi incised through the gravels seen in the adjacent quarry. Sondage A (measuring 14 m x 8m and 2.25 m deep) was located on the crest of the wadi slope, while Sondage B (the proportions of which are unknown) was located in the wadi bottom (see figure 5.4.1). The deposits exposed in two excavations produced at total of 155 faunal fragments (Van Liere 1960, 22) and 462 lithic artefacts (Van Liere 1960, 171-172).

The interest aroused by these investigations led P. J. R. Modderman to carry out further investigation at Latamne between December 1961 and January 1962 (Modderman 1964). During a brief survey of Palaeolithic findspots in the Orontes Valley around Hama, Modderman chose to reopen and expand Van Liere and Bounni's Sondage A, in order to recover more artefacts and faunal remains (Modderman 1964, 59). However, on the 9th December 1961 Modderman discovered a concentration of seven handaxes in a 5 m x 5 m area ~200 m to the south-west of Sondage A while examining the surrounding deposits (Modderman 1964, 56; see figure 5.4.1). This discovery led to the opening of a trial excavation which exposed what has become known as the Latamne "Atelier" or "Living floor" site. These initial investigations involved the hasty exposure of a 54 m^2 surface (see figure 5.4.2) and the recovery of over 400 flakes, an unspecified number of cores and 52 handaxes, along with 13 bone fragments concentrated in a thin gravel layer approximately 15 cm below the modern landsurface (Modderman 1964, 57). The extreme rapidity of this work is attested to by the fact that, in total, Modderman spent just four and a half days in December 1961, and two days in January 1962 working at Latamne, some of which time was spent re-digging and extending Sondage A (Modderman 1964, 56).

Further excavations were subsequently initiated at the "Living floor" site under the direction of J. D. Clark. This new phase of research took place between the 15th and 29th August 1964 (Clark 1966a, 32; 1967, 3). The work focussed on the area to the north-east of the 1961/1962 investigations, adjacent to that in which Modderman (1964, 59) identified the highest concentration of artefacts (Clark 1966a, 36; 1967 8). An area of approximately 42 m^2 was exposed, in addition to two extension trenches (one extending from the south-west of the main area, and one to the north-west; see figure 5.4.2). A total 1,831 lithics and 5 fragments of bone (one of which possibly retains evidence of cut marks) were recovered from the main 1964 excavation (Clark 1966a, 56; 1967, 61), in association with concentrations of limestone blocks and "rubble" (Clark 1966a, 37; 1967, 11). In the hope of tracing the limit of the "Living floor" artefact scatter and identifying further artefact concentrations, Clark returned to the site between 20th November and 12th December 1965 (Clark 1966b, 75; 1968, 1) Clark 1966b, 76; 1968, 9; see figure 5.4.2). During these investigations a total of 994 lithics and 39 fragments of bone were recovered from the main area of the site and three extension trenches (Clark 1966b, 84; 1968, 27). Despite the fact that there is some suggestion that Clark intended to return to Latamne in order to investigate a channel in which the "Living floor" artefacts appeared to be located (Clark 1966b, 78; 1968, 15), the 1965 season proved to be the last phase of research carried out at the site.

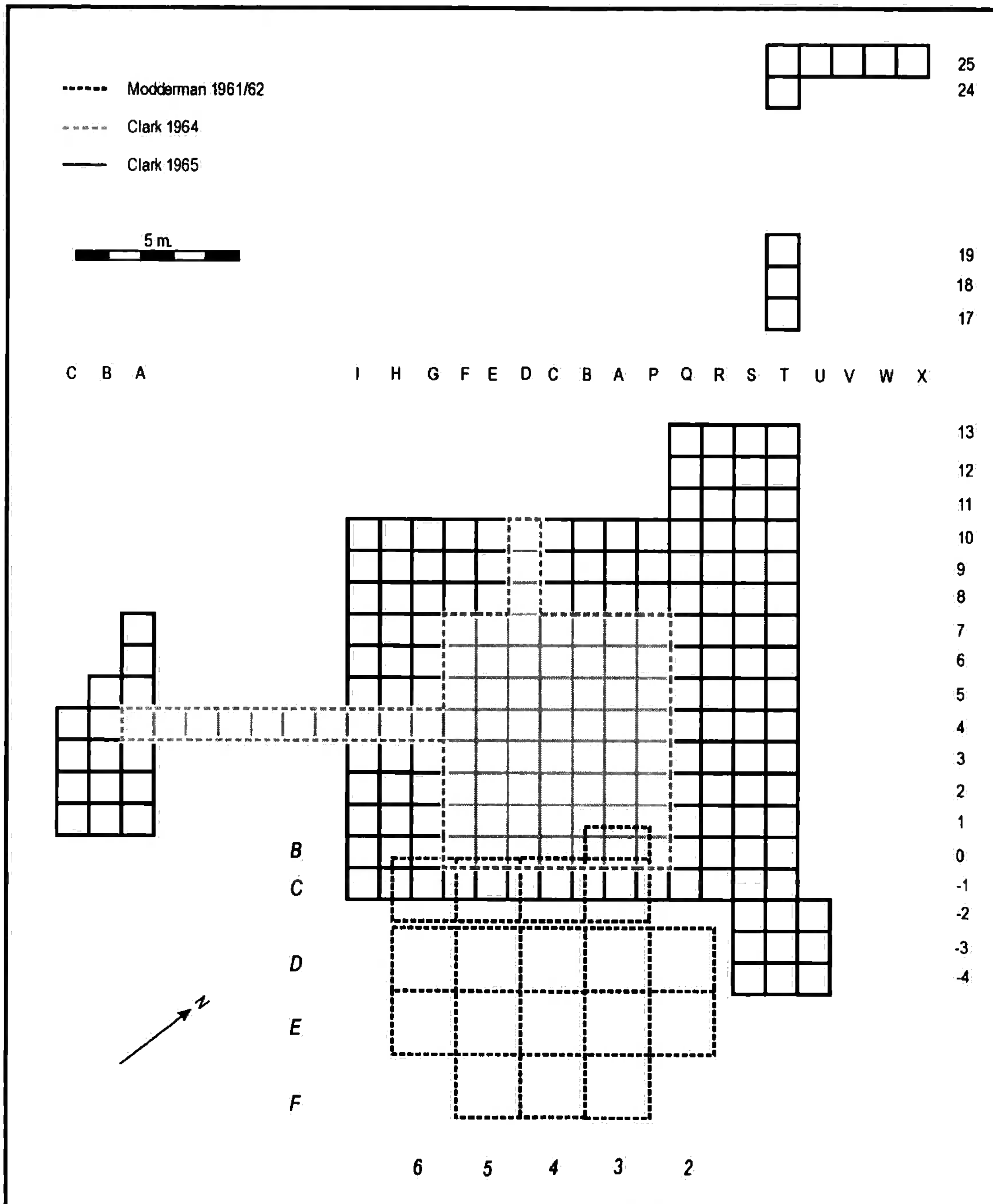

Figure 5.4.2 Ground plan of Latamne "Living floor" excavations (redrawn from Clark 1966b; 1968).

Although no further excavations have been carried out at Latamne since 1965, the Pleistocene deposits were revisited in 1977 by the CNRS survey team (see chapter four, section 4.3). During the course of this research, collections of artefacts were recovered from sections located in six quarries found in the vicinity of Latamne village (including Quarry 1); some quarry sections also produced mammalian fauna (Copeland and Hours 1993, 73). In addition, one of the CNRS survey members (J. Besançon), along with P. Mein, briefly visited the Latamne area in 1990 to collect microfaunal samples from an unspecified position within a gravel exposure in a quarry (possibly Latamne Quarry 1) near the "Living floor" site (Mein and Besançon 1993, 179). Probably at the same time and from the same locality (although this is not articulated in the published report), a small collection of fish bones was recovered from the Latamne gravels (Gayet 1993). The most recent phase of investigation into the Latamne Pleistocene deposits occurred in 1990-1991 when E. V. Deviatkin, A. E. Dodonov, K. Khatib and N. Nseir recovered ten handaxes from fluvial deposits in Latamne Quarry 1, at a depth of 8 m below the surface (Dodonov *et al.* 1993, 191).

Geological Background & Preferred Dating

As a result of the research carried out around Latamne from the 1960s onwards it is possible to recreate the general geological sequence of the Pleistocene fluvial deposits of the Latamne formation (figure 5.4.3), and the specific geological context of the "Living floor" excavations (figure 5.4.4). The Latamne gravels are cut into Upper Cretaceous chalky limestone, and consist of a sequence of fluvial deposits up to ~30 m deep, the base of which is located ~35 m above the current Orontes (De Heinzelin 1966, 116; 1968, 3). Coarse basal fluvial gravels have been noted in a wadi north of, and now subsumed by, Latamne Quarry 1 (Clark 1966a, 33; 1967, 4; see figure 5.4.1), while the contact between these coarse gravels and the Upper Cretaceous bedrock was exposed in Sondage B (Van Liere 1960, 168). All the exposures in the Latamne area are capped by a recent sandy soil up to 20 cm thick (Van Liere 1960, 169, Modderman 1964, 57, De Heinzelin 1966, 119; 1968, 16, Dodonov *et al.* 1993, 191).

The lower half of the Latamne sequence was exposed in Latamne Quarry 1, Sondage A and Sondage B. It comprises cross bedded channel gravels containing sand lenses (De Heinzelin 1966; 120; 1968, 16, Dodonov *et al.* 1993, 191). This is overlain by alternating layers of coarse and fine gravels, surmounted by lenses of gravel set within a sandy matrix (Clark 1966a, 33; 1967, 4). These deposits were visible in a quarry (henceforth Latamne Quarry 2) opened in 1962 ~150 m south-west of Latamne Quarry 1 (Van Liere 1966, 20 Clark 1966a, 33: 1968, 4; see figure 5.4.1), prospection pit 1 open during the 1964 excavations at the "Living floor" site and within the area of the "Living floor" excavations itself (Clark 1966a, 34: 1968, 5). It is from towards the top of these deposits that the "Living floor" artefacts were recovered, concentrated amongst a poorly sorted scatter of round and sub-angular chert/flint and limestone clasts set within finely bedded sand (Clark 1966a, 33; 1967, 4).

Above this the uppermost part of the sequence consists of fluvially deposited sands containing layers of silt and silty sand (Clark 1966a, 33; 1967, 4). The upper fluvial deposits are missing from the sequence in Sondage A and Quarry 1, where they have been eroded and truncated. Here they are now overlain by red colluvial deposits filling pipes and hollows in the surface of the gravel (Van Liere 1960, figure 3, De Heinzelin 1966 119; 1968, 16). The presence of typo-technologically Middle Palaeolithic artefacts in this deposit (see chapter six, section 6.4) suggests the erosion of the upper fluvial deposits occurred during the Pleistocene.

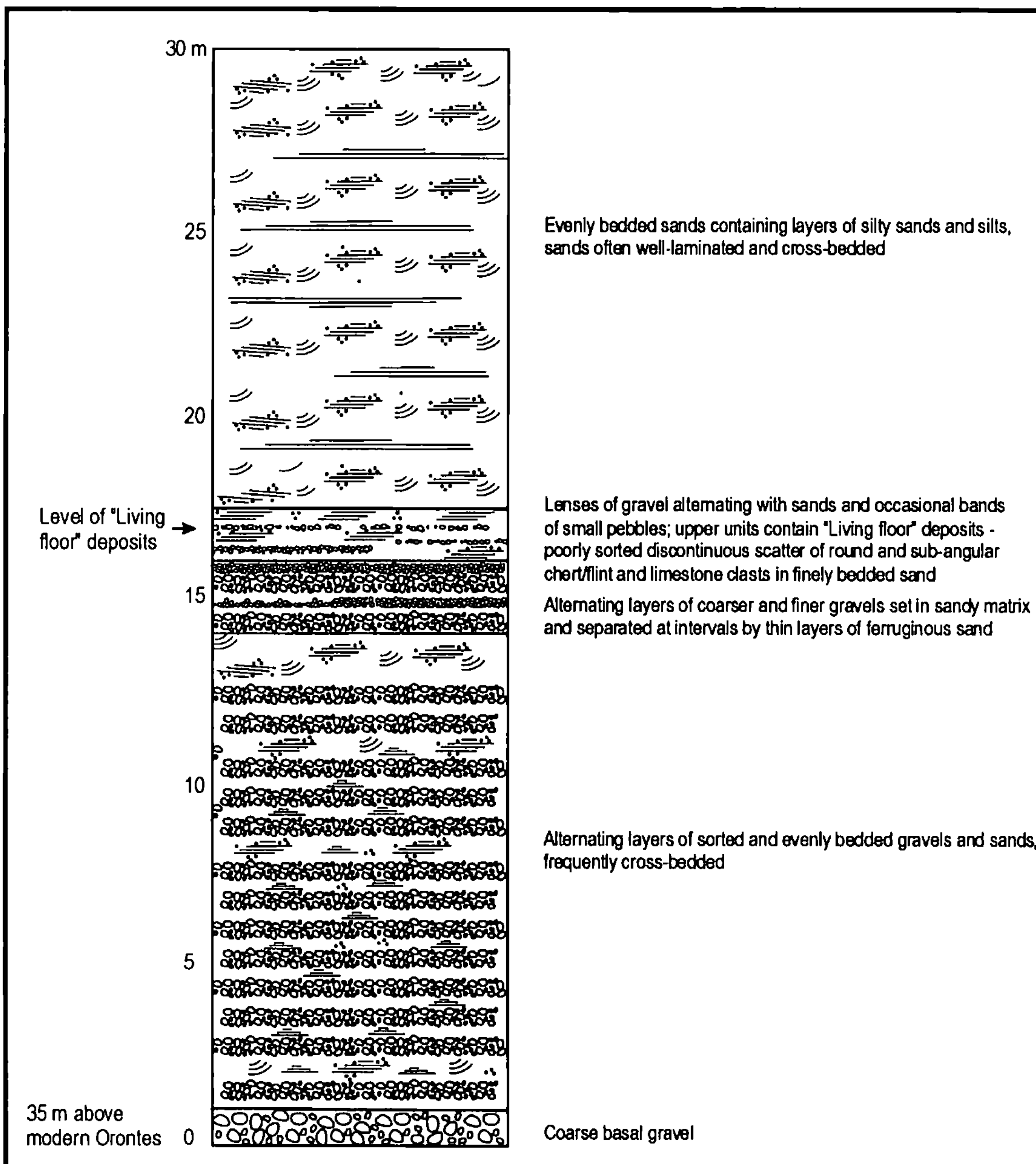

Figure 5.4.3 Composite section of Latamne Formation deposits found in the vicinity of the "Living floor" site.

In summary, the Latamne sequence consists of 30 m of fluvial gravels, sands and silts, which represent a single Orontes terrace aggradation (De Heinzelin 1966, 115; 1968, 3, Besançon and Sanlaville 1993, 28). Generally these deposits become increasingly fine grained towards the top of the sequence. The lower part of the Latamne sequence is characterised by coarse-grained deposits, laid down immediately following the downcutting of the Latamne terrace. The upper sequence comprises bank and bar deposits characteristic of a braided river system.

The deposits containing the "Living floor" artefacts are located just over half way up the fluvial sequence found at Latamne, some 17 m above the basal gravels and 52 m above the modern Orontes (De Heinzelin 1966, 116; 1968a, 3). They consist of a poorly sorted gravel horizon containing angular clasts set in a sandy matrix (Modderman 1964, 57, Clark 1966a, 34; 1967, 6, Van Liere 1966, 17) which ranges in thickness from 1 cm in the west and southern area of the 1964 excavation (Clark 1966a, 34; 1967, 6), to 18 cm thick in the 1962 excavation (Modderman 1964, 57). The "Living floor" deposits are underlain by alternating layers of coarser and finer gravels, separated at intervals by layers of ferruginous sand (Clark 1966a, 33, 1967, 4), and are overlain by compact, laminated and cross bedded sand which contains lenses of fine gravel and silt (Clark 1966a, 34; 1967, 6; see figure 5.4.4).

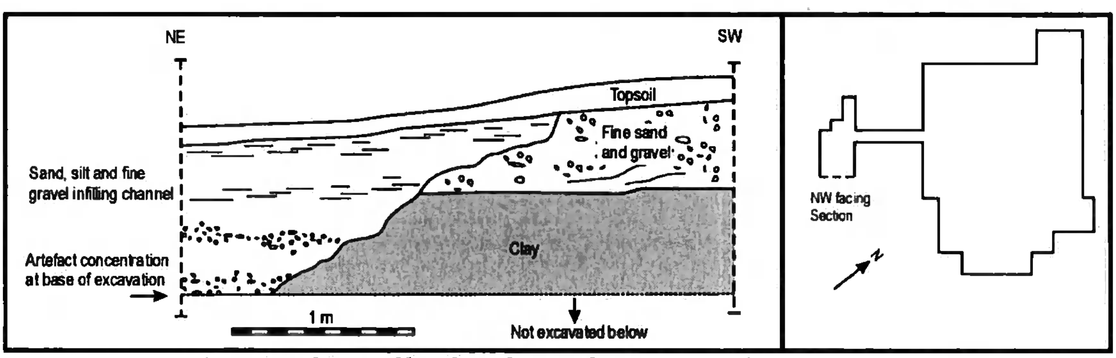

Figure 5.4.4 Stratigraphic profile of north-west facing section located in south-west extension of "Living floor" excavations illustrating position within channel of main artefact concentration and overlying deposits (redrawn from Clark 1966b; 1968).

During the last two days of the 1965 excavations at the site, dark brown, unbedded clay was exposed in the south-east corner of an extension trench located to the south-west of the main excavation (Clark 1966b, 78; 1968, 131; see figure 5.4.4 and 5.4.5). This was overlain by compact, evenly bedded fine gravels and sands. The clay, and overlying gravels and sands, were cut by a channel in which the "Living floor" and overlying fine fluvial deposits were located (Clark 1966b, 78; 1968, 15). Although Clark (1966b, 78; 1968, 15) states that the channel was "shallow," the published section (figure 5.4.4) and a photograph (figure 5.4.5), of the north-west facing section of the south-west extension trench, suggests that it was at least 1 m deep, and that it was not bottomed. Significantly, this photograph also shows the limestone blocks that were found in association with the artefact assemblage (see above) as restricted to the area of the channel, which is also apparent on the published plans of the site (see Clark 1966b; 1968).

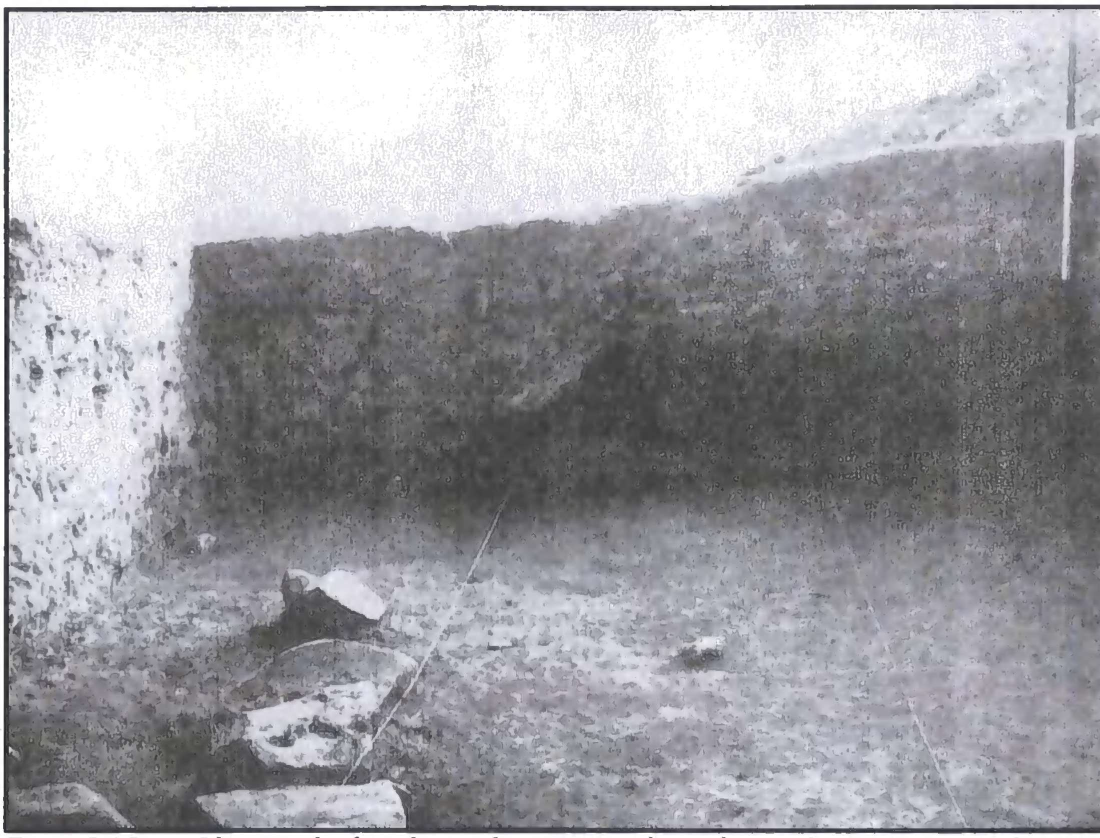

Figure 5.4.5 Photograph of north-west facing section located in south-west extension of "Living floor" excavations illustrating the profile of the channel edge and the position of limestone blocks within the channel (from Clark 1966b; 1968).

Clark attached great significance to these blocks, some of which were up to 40 cm in diameter, believing that they could not be naturally deposited "since for them to have been moved by water pre-supposes a degree of turbulence quite disproportionate to the nature of the sediments on and under which they lie" (Clark 1966a, 37; 1967, 11). Consequently, he concluded they were brought into the site by hominins from a limestone scarp located ~120 m north-west of the excavated area (Clark 1966a, 37; 1967, 11; see figure 5.4.1). Furthermore, Clark (1966a, 58; 1967, 63) also suggested that, as some of the largest blocks were aligned in a linear fashion, they actually constituted evidence of structures. He also saw pieces of limestone, flint and basalt "rubble" (rounded and sub-angular blocks less than 20 cm in greatest length, but above 3 cm) found during the course of the excavations, as "manuports" (Clark 1966a, 38; 1967, 14).

Although the possibility cannot be totally dismissed that some of the limestone and flint blocks and "rubble" associated with the "Living floor" deposits are a product hominin agency, the context of the deposits with which they are associated suggests that their presence can actually be accounted for geologically. As has been noted, the "Living floor" deposits are located within a relatively deep channel (>1 m), and consist of a poorly sorted gravel, underlain by alternating layers of coarser and finer gravel, separated and overlain by sand, fine gravel and silt. The incision of a channel of this depth, and the deposition of gravels, sands and silts, suggests a fluvial regime that could be both dynamic (channel incision and deposition of larger gravel clasts), and relatively benign (laying down of laminated sands, fine gravel and silts).

Seasonal flooding might be expected to be of even greater intensity and capable of moving large objects, particularly as the limestone scarp from which the material is thought to derive is located up-slope from the site (see Clark 1966a, figure 1; 1967, figure 1). Consequently, there is no reason to preclude the blocks and "rubble" being brought in by slope processes and/or the fluvial activity which deposited the gravel to which they are stratigraphically and vertically related (Clark 1966a, 37; 1967, 11). Moreover, it would seem that the blocks were without exception restricted to the channel itself (see above). Taken as a whole, the geological evidence indicates that the poorly sorted gravel containing angular and sub-angular limestone blocks and "rubble" which constitute the "Living floor" are the result of the down-slope movement of deposits through a combination of colluvial and fluvial processes. The lack of evidence for any discontinuity or erosion between the deposition of this deposit and the overlying gravels and sands (De Heinzelin 1966, 119; 1968, 13) suggests the deposit was not exposed for any great length of time.

Dating the deposition of the Latamne fluvial deposits is reliant on mammalian biostratigraphy. Faunal remains have been recovered from the gravels in Latamne Quarry 1 (Hooijer 1962, Van Liere 1966, 19), Latamne Quarry 2 (Van Liere 1966, 20) and one other quarry investigated by the CNRS survey (Copeland and Hours 1993, 73). Mammalian fossils were also recovered in Sondages A and B (Van Liere 1960, 116, Hooijer 1962), as well as in small numbers from the Living Floor excavations (Hooijer 1965, Clark 1966a, 56; 1966b, 84; 1967, 61; 1968, 27). The largest collections were recovered from Latamne Quarry 1 and Sondages A and B. This material was subsequently analysed by D. A. Hooijer who identified the following species: *Mammuthus trogontherii*, *Stegodon* cf. *trigonocephalus*, *Equus* sp., *Stephanorhinus hemitoechus*, *Hippopotamus* sp., *Megaloceros verticornis*, *Camelus* sp., *Bison* cf. *priscus*, *Canis* sp., *Crocuta* sp. (coprolite) and Antilopidarum gen. et spec. indet. (Hooijer 1962; 1965). Unfortunately, in view of the age of the collections and methods of recording, it is now difficult to relate this material to the specific stratigraphic unit from which it was recovered. However, given the abraded, fragmentary state of the material (see figures in Hooijer 1962; 1965) it seems that most was recovered from fluvial deposits. As the only such deposits exposed in Latamne Quarry 1 and the two sondages comprise part of the lower half of the Latamne sequence (see above), the fauna recovered from these locations can be broadly referred to the lower gravels.

Unfortunately faunal collections from other localities are small, while the specimens recovered by the CNRS survey lack specific contextual detail. The identifiable specimens whose point of recovery is known consist of a mandible of *Mammuthus trogontherii*, remains of *Hippopotamus* sp. and an unspecified number of *Equus* sp. molars from the lower gravels in Latamne Quarry 2 (Van Liere 1966, 20), together with one lower left incisor of *Camelus* cf. *dromedaries*, at least two *Equus* sp. molars, a molar of *Dama* cf. *mesopotamica*, a phalanx of *Hippopotamus* sp. and a tentatively identified molar of ?*Gazella soemmeringi* from the "Living floor" excavations (Hooijer 1965).

As noted in chapter four section 4.3 recent research suggests that the Latamne gravels most probably began to aggrade in MIS 12, since the faunal assemblage from the lower half of the sequence combines species of Mammoth and Giant Deer (*Mammuthus trogontherii* and *Megaloceros verticornis*) unknown in Eurasia after MIS 12, together with a rhinoceros (*Stephanorhinus hemitoechus*), the first Eurasian appearance of which dates to MIS 11. On this basis, it was originally suggested that the most likely MIS correlation for the lower gravels at Latamne is MIS 13 or MIS 12 (Bridgland *et al* 2003, 1084), but an MIS 12 date is now preferred (David Bridgland personal communication 2007). Following Bridgland's model for river terrace formation in temperate regions (see chapter four, section 4.3 for discussion of its applicability to Mediterranean regions), an MIS 12 date for the beginning of the Latamne terrace aggradation would suggest that, as the "Living floor" deposits are located towards the top of the sequence, they can be broadly associated with late MIS 12/early MIS 11 (for a different interpretation of the chronological implications of the Latamne biostratigraphy see Tchernov *et al.* 1994). During research by Dodonov *et al.* in 1990-1991 (see above), two widely differing radiothermoluminesence dates were obtained from fine sand fractions located within the fluvial deposits found in Latamne Quarry 1. These gave dates of 324 ± 65ky and 567 ± 42 kya respectively (Dodonov *et al.* 1993, 191).

Climate & Environment

The mammalian fauna recovered from the Latamne deposits provides some evidence for climate and environment when the Latamne "Living floor" artefacts were discarded. As discussed above, most fossils were collected from the lower gravels, and therefore broadly reflect environmental conditions during their aggradation, immediately prior to the main period of hominin activity. The presence of horse, bovid, gazelle and camel in the collections suggests an open grassland environment, whilst narrow-nosed rhinoceros and a giant deer (*Megaloceros verticornis*) are indicative of wooded areas. Proportionally, the mammalian fauna from Latamne is dominated by horse and elephant (Hooijer 1962, 131). Although a small microfaunal assemblage (Mein and Besançon 1993), together with fish bones (Gayet 1993), was also collected from the gravels at Latamne, it is unclear where in the sequence this material was recovered from.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

The current research has studied all material from the "Living floor" excavations extant in the National Museum, Damascus, Syria (see table 5.4.1).

	1961/1962 collection		1964 collection		1965 collection	
	No. of artefacts	% of total	No. of artefacts	% of total	No. of artefacts	% of total
Cores	44	7.7%	75	15.4%	3	15.8%
Handaxes	22	3.8%	26	5.3%	2	10.5%
Flakes	494	85.9%	376	77.2%	12	63.2%
Flake tools	14	2.4%	10	2.1%	2	26.4%
Hammer stone	1	0.2%	0	0.0%	0	10.5%
Total	575	100%	487	100%	19	100%

Table 5.4.1 Material analysed from Latamne "Living floor" site.

As only 19 artefacts from the 1965 excavation were discovered, none of which could be assigned to a specific context, these have been excluded from the following analysis. The 1961/1962 excavation recovered material from 18 grid squares (see figure 5.4.2), all but one of which measured 2 m x 2 m (the exception, square B3, measures 2 m x 1 m). Although concentrated in a gravel layer between 8 cm and 18 cm thick (Modderman 1964, 57, Van Liere 1966, 17) it is likely that, as appears to have been the case with the material recovered during the 1964 excavations (see below), artefacts were also recovered from the overlying fluvially bedded sands and the underlying sands and gravel. All the artefacts studied were labelled with the co-ordinates of the square from which they were recovered. Interestingly, two of the handaxes studied are labelled as coming from grid square B4, an area which was not excavated by Modderman. It therefore seems likely that these artefacts were recovered from the surface and, as such, have been excluded from further analysis. In grid squares D2-D6 and in E2-E5 the deposits were excavated in three or four arbitrary spits (Clark 1966a, 42; 1967, 24); spit level is recorded in addition to grid square on extant material from these squares. However, as this is not a stratigraphic subdivision, the information is not considered to be significant, except as providing the material with a tighter provenance.

Table 5.4.3 summarizes the published artefact numbers recovered from each square during the 1961/1962 excavation, and the number of extant artefacts recorded during this study. The published figures include data produced by Modderman (1964) and Clark (1966a; 1967). It should be noted that the counts illustrated for Clark are an estimate, due to the terminology used in the original excavation report. The flakes include artefacts referred to in the original publication as "small scrapers," "proto-burins," "burins," "blades" and "blade fragments;" while the cores include "choppers," "polyhedrons" and "core scrapers" and the handaxes include cleavers and "bifacial knives." All pieces originally recorded as chunks and anvils have been excluded from the counts as the vast number of pieces which could be described in such terms in the extant 1961/1962 collection are not of human manufacture (personal observation).

	Modderman (1964)			Clark (1966a)			Artefacts studied		
	Cores	**H/axes**	**Flakes**	**Cores**	**H/axes**	**Flakes**	**Cores**	**H/axes**	**Flakes**
B3	?	4	?	0	4	1	0	2	1
C6	?	0	7	0	1	9	0	0	7
C5	?	1	17	0	1	22	1	0	19
C4	?	5	21	1	6	26	2	2	27
C3	?	1	5	4	1	11	4	0	8
D6	?	3	27	1	3	43	1	1	35
D5	?	3	41	3	3	57	3	2	45
D4	?	7	92	7	7	141	8	2	115
D3	?	6	30	9	4	53	8	1	32
D2	?	4	3	2	3	7	2	0	7
E6	?	0	15	0	0	17	1	0	18
E5	?	2	36	0	2	64	1	1	55
E4	?	2	52	5	1	92	2	3	73
E3	?	6	20	4	5	30	8	1	20
E2	?	0	4	0	0	9	1	0	6
F3	?	3	11	1	5	13	1	4	14
F4	?	2	25	0	2	31	1	1	26
F5	?	0	0	0	0	0	0	0	0
Total	?	49	406	37	48	626	44	20	508

Table 5.4.2 Number of artefacts reportedly recovered from each grid square of 1961/1962 "Living floor" excavations compared to number of artefacts assigned to particular squares during the current study. Excavated figures based on Modderman (1964), Clark (1966a, 1967).

It can be seen that a similar number of flakes and cores are present within the assemblage studied as are recorded in the excavation reports. However, the collection housed in Damascus Museum is lacking over half the excavated handaxe assemblage. This observation is probably explained by the fact that most museums in Syria have a number of handaxes from the Latamne "Living floor" site on display in their collections (personal observation). Handaxes aside, it seems that the material analysed from the 1961/1962 excavation largely reflects the original excavated assemblage, both in terms of the absolute number of artefacts per square and the relative number of artefact types in each square. One surprising feature of this data is the fact that Modderman (1964), the original excavator, recorded fewer flakes than were reported by Clark (1966a; 1967) and than are present within the extant collection in Damascus Museum. This would seem to indicate that Modderman filtered out flakes from his counts on the basis of some unspecified criteria, for example size or portion.

The material recovered by Clark during the 1964 excavations came from the same deposits as the 1961/1962 collection, but from the area immediately to the north-west of Modderman's trench, which it overlapped along its south-eastern edge (see figure 5.4.2). The majority of artefacts from the 1964 excavation are individually labelled with both the grid square and either the letters f, af or bf (e.g. F1/f). It seems reasonable to assume that this lettering system equates to floor, above floor and below floor, indicating that material was vertically distributed amongst the overlying bedded sands and underlying sands and gravels, as well as the sands and gravels of the "Living floor" deposit (see above). Many of the remaining artefacts recovered during the 1964 excavations are labelled to square followed by the number 1 (e.g. F2/1), rather than being labelled to square and f, af, or bf. Given that no evidence exists of any artefacts being recovered from any level other than that associated with the "Living floor" deposits during the 1964 investigations, and the similarity of the markings retained on these artefacts to those definitely from this level, it is almost certain that the artefacts also came from the same deposit as the rest of the collection, and they are treated as such here. Six cores and sixty flakes in the collection studied are labelled as coming from an extension trench. As it is not possible to ascertain for certain from which of the two 1964 extensions trenches these artefacts originate, or where within the deposits they were recovered, these have been excluded from further analysis.

Table 5.4.3 summarizes the published number of artefacts recovered from each grid square of the main 1964 excavation area (Clark 1966a; 1967) and the number of artefacts recorded during this analysis. Like Clarks' artefact counts for material recovered during the 1961/1962 excavations, those provided here for the 1964 collection should be regarded as an informed estimate due to the terminology used during the original analysis of the material (see above). As is the case for the 1961/1962 material, the number of extant handaxes analysed from the 1964 collection is significantly less than the number recovered during excavation and, as such, the same explanation probably applies; namely that a large number of these artefacts are on display in museums across Syria. The overall number of cores analysed is close to the number recorded by Clark, although significant variability exists within individual squares. In some instances the number of cores recorded in the collections of Damascus Museum is higher than the number recorded by Clark, a fact which is probably accounted for by the large number of chunks which have been excluded from Clark's counts, a small proportion of which probably represent cores, or at least core fragments.

	Clark (1966a; 1967)			Artefacts studied		
	Cores	Handaxes	Flakes	Cores	Handaxes	Flakes
A0	1	0	29	1	1	3
A1	4	4	10	1	3	9
A2	3	1	21	3	1	10
A3	1	1	7	2	0	3
A4	0	0	11	0	0	4
A5	0	0	7	1	0	2
A6	0	0	5	0	0	1
A7	0	0	17	2	0	5
B0	0	1	17	0	1	2
B1	2	2	14	2	0	2
B2	3	0	19	7	0	9
B3	1	0	30	1	0	16
B4	7	0	11	5	0	3
B5	0	0	0	0	0	0
B6	0	0	3	0	0	1
B7	0	0	4	0	0	1
C0	0	0	18	0	0	1
C1	4	5	35	1	3	13
C2	4	4	14	3	1	2
C3	4	3	30	4	1	14
C4	3	1	16	6	1	8
C5	2	2	16	1	1	6
C6	0	0	10	0	0	11
C7	0	0	6	1	0	4
D0	2	1	30	1	0	5
D1	3	1	56	3	1	3
D2	0	1	15	0	1	1
D3	2	1	26	0	1	19
D4	4	3	19	2	3	10
D5	3	1	17	3	1	10
D6	0	0	2	0	0	2
D7	0	0	6	0	0	3
D8	0	0	1	0	0	1
D9	0	0	2	0	0	0
D10	0	0	0	0	0	0
E0	0	0	29	0	0	4
E1	1	0	30	1	0	20
E2	3	1	31	3	1	12

	Clark (1966a; 1967)			Artefacts studied		
	Cores	Handaxes	Flakes	Cores	Handaxes	Flakes
E3	0	0	11	0	0	1
E4	0	1	6	0	0	7
E5	3	0	4	2	0	2
E6	0	2	3	2	1	6
E7	0	0	3	0	0	1
F0	0	1	4	1	1	2
F1	1	1	25	1	1	20
F2	0	1	33	0	0	21
F3	0	0	13	1	0	9
F4	1	0	5	2	0	0
F5	0	0	12	1	2	6
F6	0	0	12	1	0	8
F7	2	0	5	0	0	1
P0	2	0	11	2	0	3
P1	0	0	13	1	0	2
P2	0	0	14	1	0	2
P3	0	0	4	0	0	1
P4	3	1	10	0	0	6
P5	0	0	8	0	0	1
P6	0	0	9	0	0	3
P7	3	0	14	0	0	4
Total	72	40	833	69	26	326

Table 5.4.3 Number of artefacts reportedly recovered from each grid square of 1964 "Living floor" excavations compared to number of artefacts assigned to particular squares during the current study. Excavated figures based on Clark (1966a, 1967).

It is clear from table 5.4.3 that there is a major discrepancy between the number of flakes recorded by Clark and the numbers found in the collection studied. On the face of it, this might indicate that a large proportion of the flakes originally recovered during the 1964 excavation are not amongst those stored in Damascus. However, it should be noted that a large number of pieces exist amongst the collection analysed which were not recorded as they do not exhibit features indicative of conchoidal fracture, or deliberate working (personal observation). Consequently, there is a distinct possibility that many of the 507 "flakes" recorded by Clark, but not identified during the current research, were never truly artefacts.

Taphonomy of lithic assemblages

The taphonomic data recorded for the selected artefacts from the 1961/1962 and 1964 "Living floor" excavations suggests that the two assemblages have broadly similar depositional histories (see tables 5.4.4, 5.4.5 and 5.4.6). The majority of the cores (85.8%; combined figure), handaxes (89.1%; combined figure) and flakes (78.8%; combined figure) in the two collections are in fresh condition, while both possess a smaller number of artefacts that are moderately or heavily abraded (7% of the combined assemblages). This suggests that, although a few artefacts in the both collections may have undergone prolonged fluvial transport, the vast majority have only been rearranged minimally, if at all.

Cores from Latamne "Living floor" site (n=113)									
	1961/1962 collection		**1964 collection**			**1961/1962 collection**		**1964 collection**	
Unabraded	36	81.8%	61	88.4%	*No edge damage*	18	40.9%	36	52.1%
Slightly abraded	4	9.1%	8	11.6%	*Slight edge damage*	22	50.0%	31	44.9%
Moderately abraded	4	9.1%	0	0.0%	*Moderate edge damage*	4	9.1%	2	3.0%
Heavily abraded	0	0.0%	0	0.0%	*Heavy edge damage*	0	0.0%	0	0.0%
Unstained	4	9.0%	2	3.0%	*Unpatinated*	0	0.00%	0	0.0%
Lightly stained	5	11.4%	11	15.9%	*Lightly patinated*	2	4.6%	17	24.6%
Moderately stained	12	27.3%	9	13.0%	*Moderately patinated*	27	61.4%	25	36.2%
Heavily stained	23	52.3%	47	68.1%	*Heavily patinated*	15	34.0%	27	39.2%

Table 5.4.4 Condition of cores studied from 1961/1962 and 1964 excavations at Latamne "Living floor" site.

Handaxes from Latamne "Living floor" site (n=46)									
	1961/1962 collection		**1964 collection**			**1961/1962 collection**		**1964 collection**	
Unabraded	17	85.0%	24	92.3%	*No edge damage*	3	15.0%	0	0.0%
Slightly abraded	1	5.0%	2	7.7%	*Slight edge damage*	13	65.0%	19	73.1%
Moderately abraded	2	10.0%	0	0.0%	*Moderate edge damage*	4	20.0%	7	26.9%
Heavily abraded	0	0.0%	0	0.0%	*Heavy edge damage*	0	0.0%	0	0.0%
Unstained	0	0.0%	0	0.0%	*Unpatinated*	0	0.0%	0	0.00%
Lightly stained	1	5.0%	0	0.0%	*Lightly patinated*	1	5.0%	2	7.7%
Moderately stained	3	15.0%	0	0.0%	*Moderately patinated*	19	95.0%	24	92.3%
Heavily stained	16	80.0%	26	100%	*Heavily patinated*	0	0.0%	0	0.0%

Table 5.4.5 Condition of handaxes studied from 1961/1962 and 1964 excavations at Latamne "Living floor" site.

Flakes from Latamne "Living floor" site (n=834)									
	1961/1962 collection		1964 collection			1961/1962 collection		1964 collection	
Unabraded	410	80.7%	247	75.7%	*No edge damage*	58	11.4%	88	27.0%
Slightly abraded	69	13.6%	45	13.8%	*Slight edge damage*	372	73.2%	173	53.0%
Moderately abraded	28	5.5%	26	8.0%	*Moderate edge damage*	76	15.0%	61	18.8%
Heavily abraded	1	0.2%	8	2.5%	*Heavy edge damage*	2	0.4%	4	1.2%
Unstained	45	8.9%	31	9.5%	*Unpatinated*	12	2.4%	26	8.0%
Lightly stained	83	16.3%	53	16.2%	*Lightly patinated*	147	28.9%	164	50.3%
Moderately stained	210	41.3%	99	30.4%	*Moderately patinated*	341	67.1%	134	41.1%
Heavily stained	170	33.5%	143	43.9%	*Heavily patinated*	8	1.6%	2	0.6%

Table 5.4.6 Condition of flakes studied from 1961/1962 and 1964 excavations at Latamne "Living floor" site.

Despite the fact that the artefacts are generally in fresh condition, most display some evidence of edge damage (79.3% of combined assemblages), probably reflecting the combined results of trampling while the artefacts were exposed on the surface, along with the fact that the artefacts, although generally not abraded, are associated with a fluvial depositional environment. Curation practices could also have had a contributory factor. It is also apparent that proportionally more handaxes (93.5%; combined figure) and flakes (82.5%; combined figure) display evidence of edge modification than the cores (52.2%; combined figure). This is likely to reflect the fact that the handaxes and flakes possess lenticular profiles and feather edges susceptible to edge damage, unlike the cores, which tend to retain a globular profile.

The degree of patination evident on the artefacts from both assemblages is also broadly consistent. Both flake assemblages tend to be lightly to moderately patinated (79.2%; combined figures), while the handaxes in the two collections are generally moderately patinated (93.5%; combined figures) and the cores moderately to heavily patinated (83.2%; combined figures). The slight tendency for the cores to be more patinated than the other material is difficult to account for since chemical alteration of artefact surfaces is poorly understood. In both collections the majority of the cores (80.5%; combined figures), handaxes (97.8%; combined figures) and flakes (74.6%; combined figures) are moderately or heavily stained.

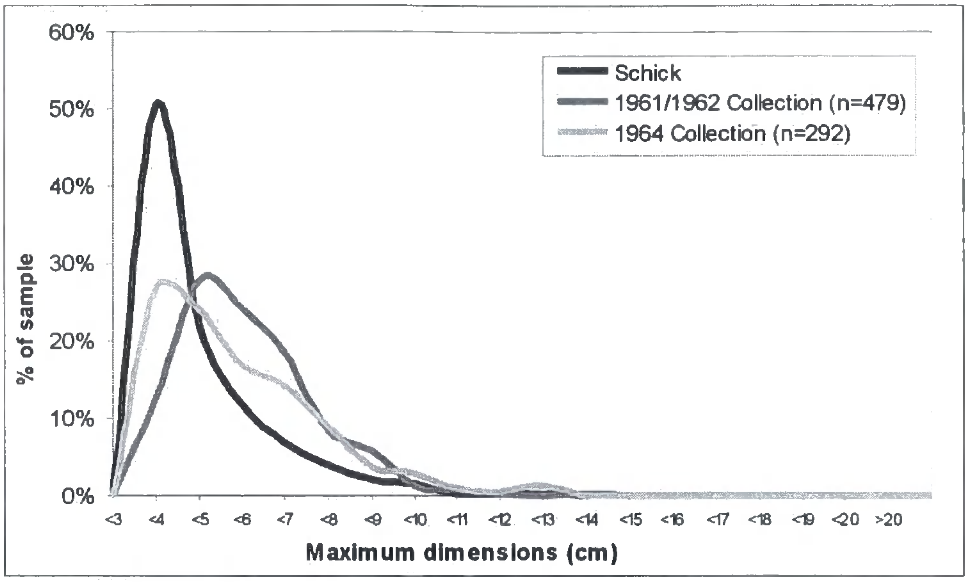

Figure 5.4.6 Comparison of maximum dimension of debitage larger than 2 cm from the 1961/1962 and 1964 Latamne "Living floor" excavations, and experimental data generated by Schick (1986).

Further insights into the degree of post-depositional disturbance the non-fluvially derived material has undergone can be obtained by comparing the maximum size range of the flakes from the 1961/1962 and 1964 excavations (excluding moderately and heavily abraded material) to Schick's (1986) data produced during experimental non-prepared core reduction (figure 5.4.6). As there is no indication that the deposits from either excavation were sieved, artefacts less than 2 cm in maximum dimension have not been included in this analysis as, even if present originally, such material is unlikely to have been recovered. It can be seen that, although material less than 4 cm in maximum dimension is under-represented in the collections, the data from both assemblages is remarkably close to the experimental results. This suggests that although some winnowing may have taken place, most of the artefacts recovered during both excavations have undergone only slight post-depositional disturbance.

Spatial distribution of lithic assemblages

Arguably, the flakes and cores studied from the "Living floor" site reflect the original, largely primary context, assemblages recovered during both the 1961/1962 and 1964 excavations (see above). Excluding the clearly derived material, it is therefore possible to consider the horizontal spatial distribution of the flakes and cores studied by comparing the relative number of artefacts recovered from individual squares dug during the two excavations. In contrast, the handaxe collections studied, although also apparently in primary context, clearly have a significant number of missing pieces (see above). Consequently, their distribution can not be considered to accurately reflect that of the original assemblages. Fortunately, however, the position of the handaxe encountered during both the 1961/1962 and 1964 excavations were recorded and published by their excavators (Modderman 1964, Clark 1966a; 1967) and these have been utilised here. Although fresh and re-worked examples are not differentiated on these plans, this is not considered to be a major draw-back as only a single handaxe from these excavations showed significant signs of fluvial transport (see Clark 1966a; 1967 tables 1 and 4)

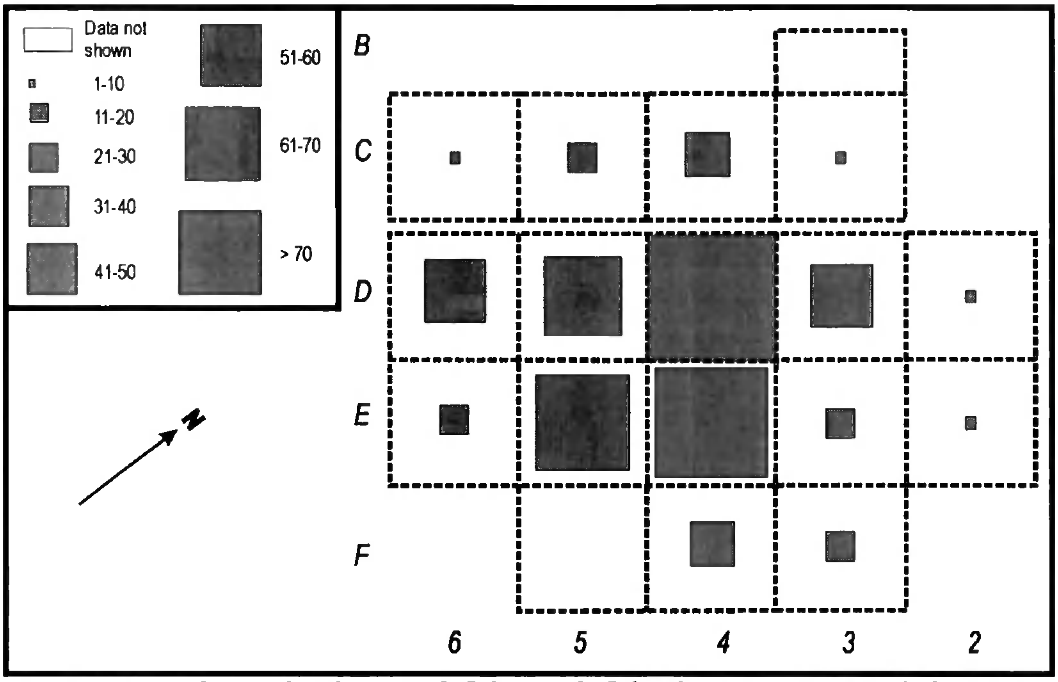

Figure 5.4.7 Relative distribution of flakes and flake fragments recovered from area excavated during the 1961/1962 excavations at the Latamne "Living floor" site.

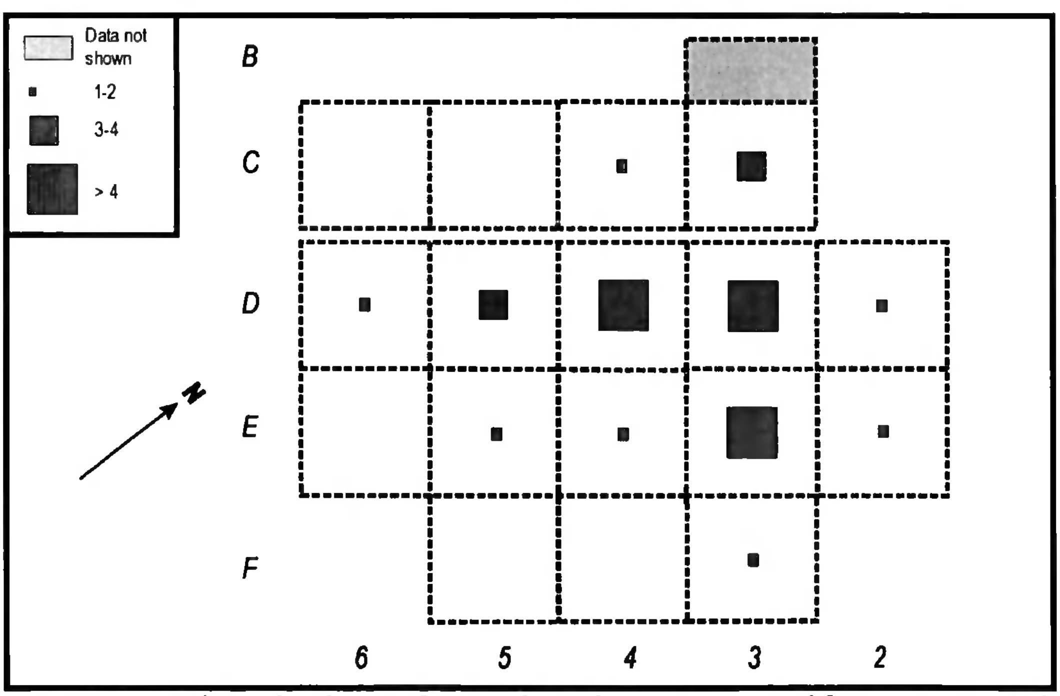

Figure 5.4.8 Relative distribution of core and core fragments recovered from area excavated during the 1961/1962 excavations at the Latamne "Living floor" site.

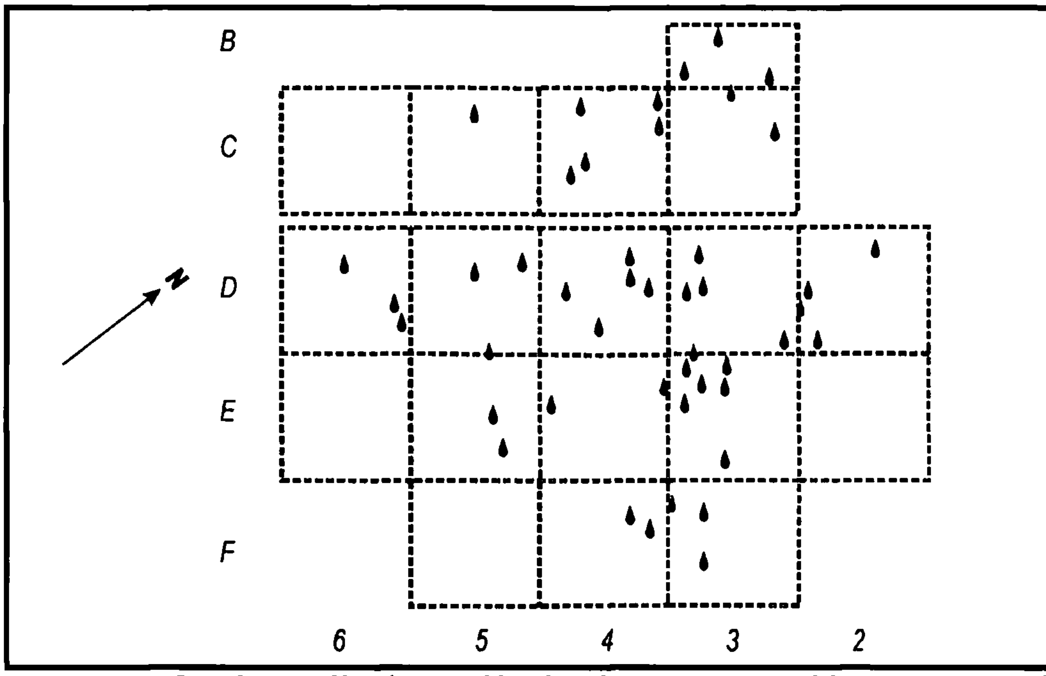

Figure 5.4.9 Distribution of handaxes and handaxe fragments recovered from area excavated during the 1961/1962 excavations at the Latamne "Living floor" site (redrawn from Modderman 1964).

Figure 5.4.7 illustrates the density of flakes in each square of the 1961/1962 excavation. It can be seen that the debitage was concentrated towards the centre of the excavation, with a radiating drop-off from a highpoint in square D4. Interestingly, the only definite hammerstone identified in either of the collections, a spherical lump of limestone, was recovered from square D3. The spatial distribution of the cores (see figure 5.4.8) and handaxes (see figure 5.4.9) follow a broadly similar pattern to the flakes, and are concentrated near areas that also produced the largest amounts of debitage. In addition, areas which produced few, if any, flakes also produced very few cores and handaxes. It should be noted that, as the area was excavated using a large-scale grid of 2 m x 2 m squares, it is likely that the concentrations of material evident from these distribution plans could potentially conflate a number of smaller accumulations. Given that the artefacts recovered during 1961/1962 seem to be minimally disturbed, their distribution patterns suggest that knapping scatter(s) existed in the excavated area, concentrated in the centre of the trench. Although some pieces may have been removed from the excavated area, this data also suggests that some cores and handaxes were discarded where flaking was undertaken.

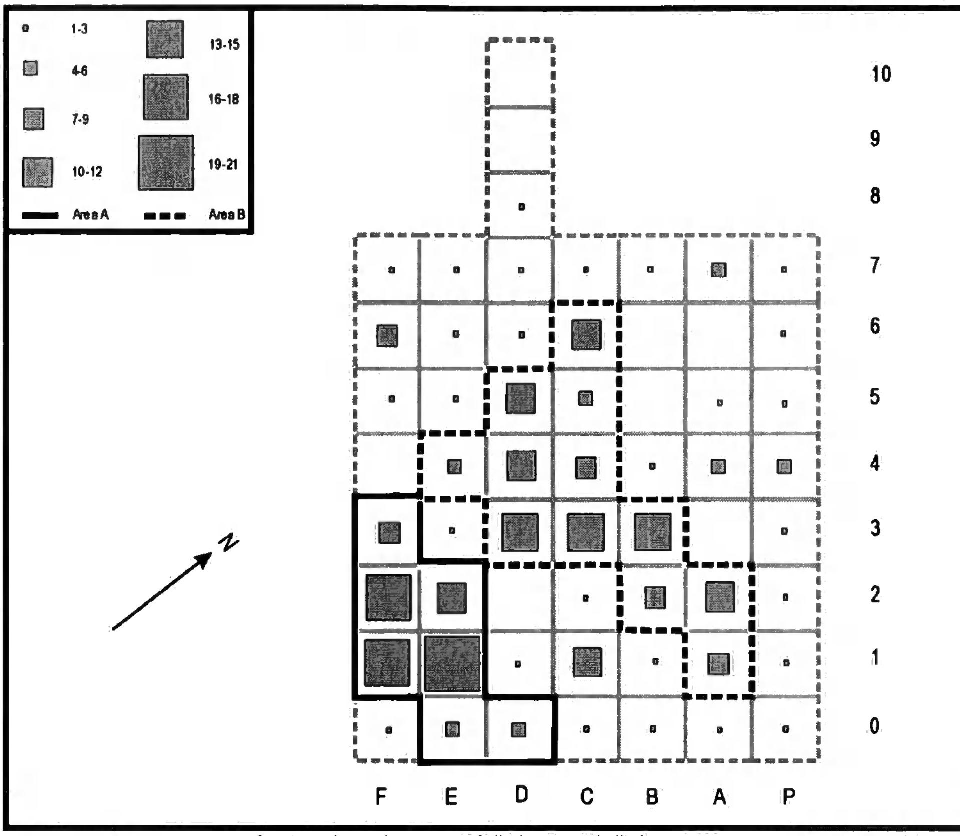

Figure 5.4.10 ***Relative distribution of flakes and flake fragments recovered from area excavated during the 1964 excavations at the Latamne "Living floor" site.***

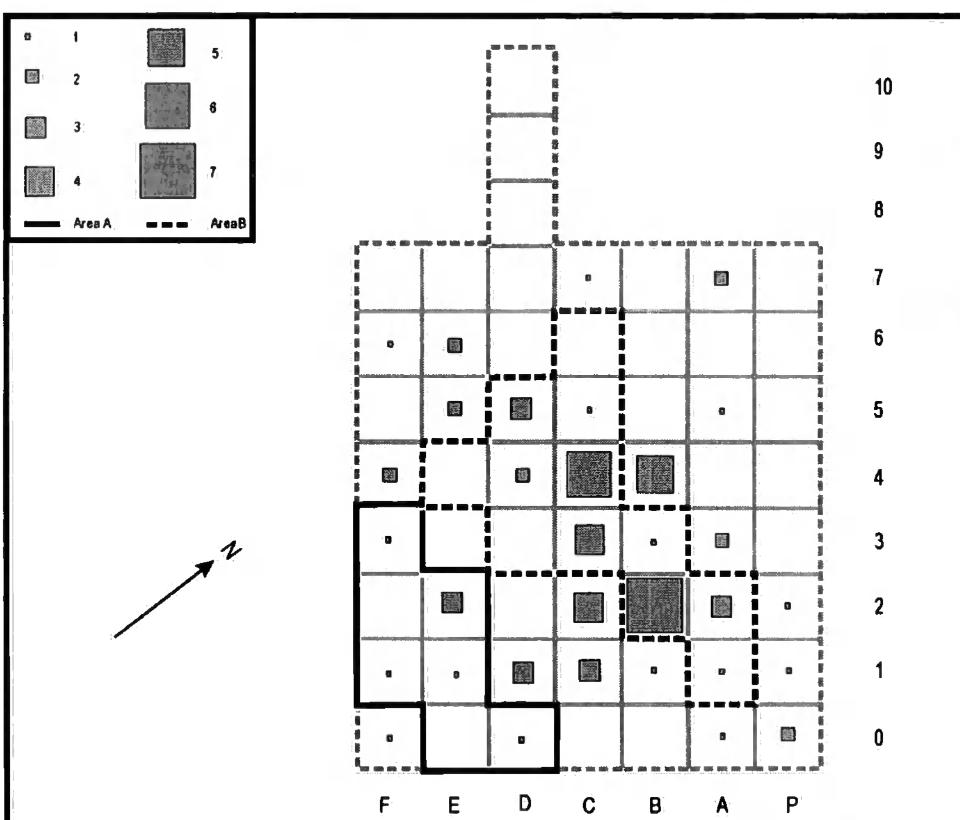

Figure 5.4.11 ***Relative distribution of cores and core fragments recovered from area excavated during the 1964 excavations at the Latamne "Living floor" site.***

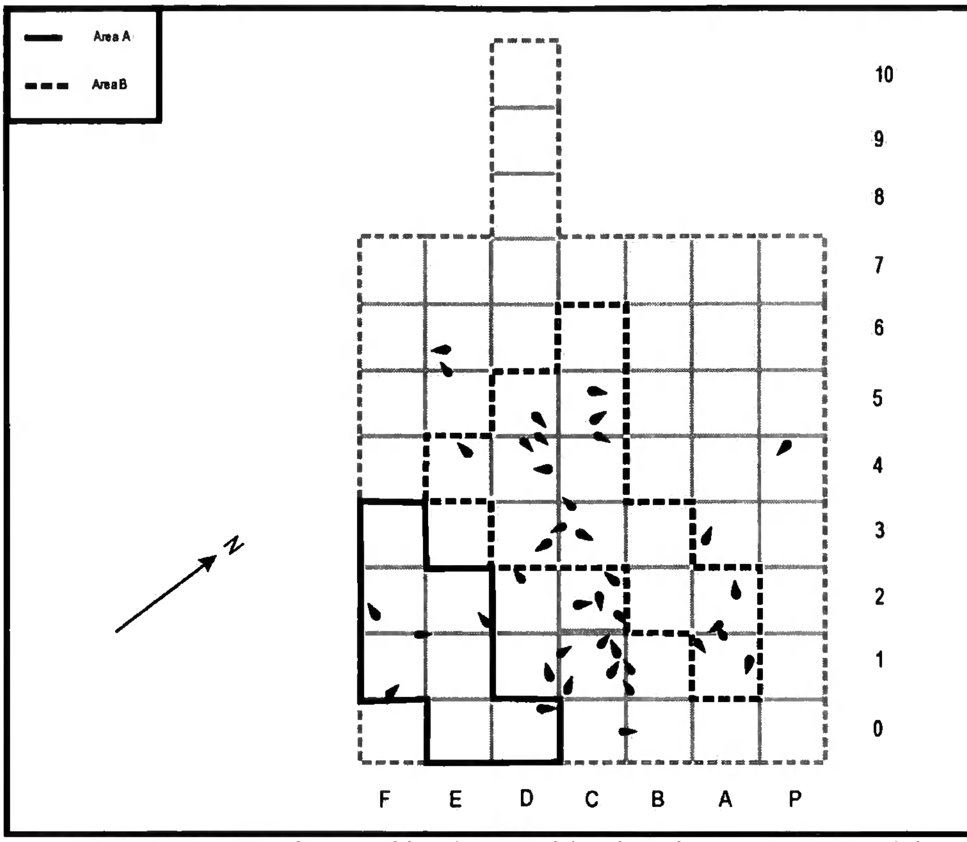

Figure 5.4.12 Distribution of handaxes and handaxe fragments recovered from area excavated during the 1964 excavations at the Latamne "Living floor" site (redrawn from Clark 1966a; 1967).

The horizontal distribution of flakes from the 1964 "Living floor" excavation is illustrated in figure 5.4.10. This shows a concentration of flakes focussed on grid squares E1, F1 and F2 (henceforth 1964 Area A), as well as a less defined spread of debitage located towards the centre of the main excavation (henceforth 1964 Area B). Figure 5.4.11 and 5.4.12 illustrates the distribution of cores and handaxes recovered from this excavation. As with the material from the 1961/1962 excavations, the cores and handaxes recovered during the 1964 excavation come predominantly from areas associated with the highest concentrations of flakes (see figures 5.4.11 and 5.4.12), potentially indicating that these scatters result from core and handaxe working. Furthermore, their distribution demonstrates that such pieces were discarded amongst these knapping scatters.

It seems unlikely that these concentrations are the result of fluvial rearrangement. Comparison of the size range of the flakes from Areas A and B with Schick's (1986) experimental data (see figure 5.4.13) shows that the assemblage from Area A is an almost exact match for the predicted distribution. This indicates that the debitage from this area comprises a minimally disturbed knapping scatter. Although the material from Area B does not display the same exact correlation (pieces under 4 cm are under-represented) the data does display a close fit with the experimental results. This suggests that, although some light winnowing may have taken place, this material is minimally disturbed. Both Areas A and B therefore appear to represent genuine knapping scatters associated with core and/or handaxe working.

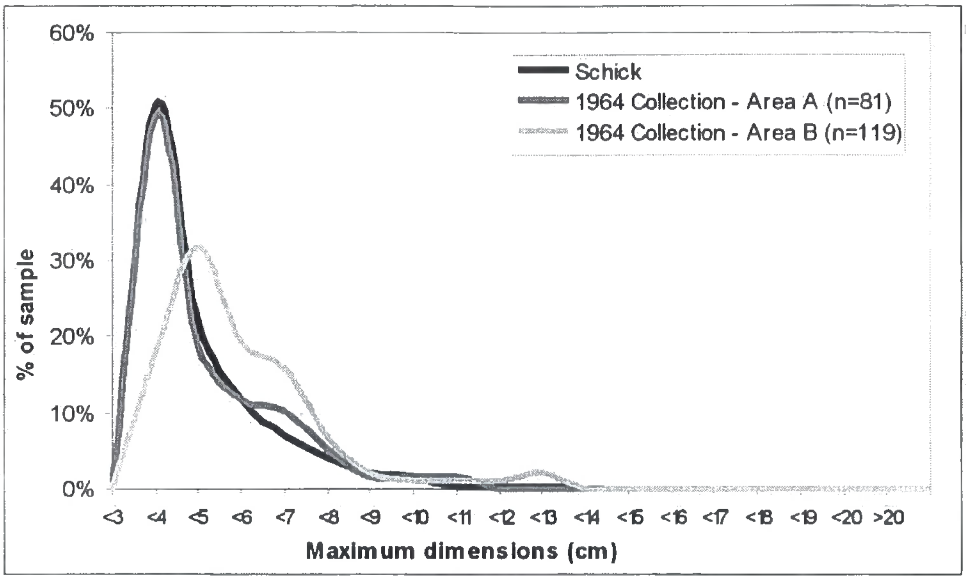

Figure 5.4.13 Comparison of maximum dimension of debitage larger than 2 cm from Area A and Area B of the 1964 Latamne "Living floor" excavations, and experimental data generated by Schick (1986).

Technology of lithic assemblage

Technological analysis has focussed on material clearly associated with the primary context artefact scatters identified above. All derived artefacts (i.e. those which are moderately or heavily abraded) have been excluded.

Raw Material

	Cores (n=113)	Handaxes (n=46)	Flakes (n=771)
Raw material			
Fresh	68.1%	84.8%	54.7%
Derived	19.5%	13.0%	15.2%
Indeterminate	12.4%	2.2%	30.1%
Blank form			
Nodule (Rounded)	43.4%	19.7%	-
Nodule (Tabular)	23.0%	47.7%	-
Shattered Nodule	10.6%	8.6%	-
Flake	1.8%	4.4%	-
Thermal flake	2.6%	2.2%	-
Indeterminate	18.6%	17.4%	-

Table 5.4.7 Raw material and inferred blank form for artefacts studied from Latamne "Living floor" site (data for 1961/1962 and 1964 collections combined).

Aside from a single limestone hammer, all the "Living floor" artefacts studied were produced on coarse-grained chert/flint. While some (15.6%; combined figure) are fashioned from waterworn blanks, the majority (57.9%; combined figure) retain chalky cortex indicative of the exploitation of material from a bedrock source (table 5.4.7). The former probably derives from the fluvial deposits with which the artefacts are associated. A likely point of origin for the latter is located ~120 m north-west of the "Living floor" excavations (see figure 5.4.1) where blocks of chert/flint have been noted outcropping from the chalky limestone bedrock (Clark 1966a, 37; 1967, 11). Fresh chert/flint blocks (or the artefacts produced on them) may therefore have been introduced into the Latamne "Living floor" deposits by hominins; however, the geological context of the material (see above) raises the possibility that this material was brought into the site as part of a high intensity, but short duration, fluvial event.

Fresh chert/flint nodules were most frequently exploited (66.0%; combined figure) for the reduction of the cores and production of the handaxes studied (table 5.4.7). Notably, however, it seems that derived nodules were slightly *more* likely to be employed in core working than handaxe production (19.5% as opposed to 13.0%). Furthermore, whereas rounded nodules seem to have been preferentially selected for core working (62.2% of those produced on nodular blanks), tabular nodules were most frequently selected for handaxe manufacture (71.0%). Taken together, this suggests that the hominins who produced this material considered spherical nodules (both in the form of fresh blanks and gravel clasts) to be a more suitable source of flake blanks, than flat elongated nodules (for the most part only obtainable from bedrock), which were favoured for handaxe production.

Core Working

	Maximum dimensions (mm)	**Weight (grams)**
Mean	78.7	290.9
Median	74.3	196.0
Min	36.9	17.0
Max	159.8	1792.0
St.Dev.	28.4	309.7

Table 5.4.8 Latamne "Living floor" cores summary statistics (n=99, fragments excluded; data for 1961/1962 and 1964 collections combined).

Although the core assemblages from the 1961/1962 and 1964 "Living floor" excavations were analysed separately, as no significant difference between the data sets was apparent, they are presented here as a single assemblage (tables 5.4.8 and 5.4.9).

Cores; technological observations (n=109)					
Overall core reduction (n=109)			Core episodes (n=172)		
Migrating platform	79	72.5%	*Type A: Single Removal*	11	6.4%
Single platform unprepared	9	8.3%	*Type B: Parallel flaking*	38	22.1%
Opposed platform unprepared	1	0.9%	*Type C: Alternate flaking*	95	55.2%
Discoidal	10	9.2%	*Type D: Unattributed removal*	28	16.3%
Fragment	10	9.2%			
Flake scars/core (n=99)			Core episodes/core		
1-5	26	26.3%	*Min*	1	-
6-10	34	34.3%	*Max*	5	-
11-15	32	32.3%	*Mean*	1.7	-
>15	7	7.1%			
Max	23	-	Flake scars/core episode		
Mean	9.4	-	*Min*	1	-
			Max	22	-
% Cortex (n=99)			*Mean*	5.5	-
0	5	5.1%			
>0-25%	42	42.3%	Blank form retained? (n=99)		
>25-50%	20	20.2%	*Yes*	64	64.6%
>50-75%	26	26.3%	*No*	35	35.4%
>75%	6	6.1%			

Table 5.4.9 Technological observations for cores from Latamne "Living floor" (data for 1961/1962 and 1964 collections combined).

Migrating platform cores, the result of the *ad hoc* exploitation of particular platforms as they become available throughout reduction, dominate the cores studied (72.5%). They tend to be medium-sized with an average maximum dimension of 78.7 mm and an average weight of 290.9 grams. Reduction seems to have been reasonably intensive with an average of 9.4 flake scars evident on each core. However, working does not appear to have been deliberately extended beyond a certain point, as only 7.1 % of the cores possess more than 15 flake scars, while the number of episodes of flaking evident on each core is limited to an average of 1.7. This indicates that, in general, once reduction reached a point at which medium-sized flakes could no longer be detached from the surface of a core, no further working was attempted.

Most cores (94.9%) retain some cortex, approximately half (52.6%) of which retain over 25%. This, along with the fact that original form of the blank can be inferred for 64.6%, strengthens the impression that reduction of the "Living floor" cores tended not to be deliberately prolonged. In addition, it illustrates that the blanks exploited (mostly rounded nodules - see above) were often not much larger than the cores when abandoned. This suggests core working at the Latamne "Living floor" site was characterised by limited, *ad hoc* flaking of medium-sized, round chert/flint nodules.

Handaxes

As with the cores, the handaxe assemblages from the 1961/1962 and 1964 "Living floor" excavations were analysed separately, but again no significant difference between the data sets were apparent. Consequently, they are considered here as a single assemblage (tables 5.4.10 and 5.4.11).

	Length (mm)	Breadth (mm)	Thickness (mm)
Mean	143.1	81.8	57.6
Median	149.0	83.0	51.6
Min	82.8	45.2	30.1
Max	195.5	105.1	82.8
St.Dev.	24.9	13.3	12.5

Table 5.4.10 Latamne "Living floor" handaxes summary statistics (n=39, fragments excluded - data for 1961/1962 and 1964 collections combined).

Handaxes; technological observations (n=46)					
Portion (n=46)			Hammer mode (n=46)		
Whole	39	84.7%	*Hard*	42	91.3%
Tip	2	4.4%	*Soft*	4	8.7%
Butt	2	4.4%	*Mixed*	0	0%
Fragment	3	6.5%	*Indeterminate*	0	0%
Cortex retention (n=39)			Cortex position (n=39)		
0	0	0.0%	*None*	0	0.0%
>0-25%	17	43.6%	*Butt only*	6	15.4%
>25-50%	16	41.0%	*Butt and edges*	3	7.7%
>50-75%	5	12.8%	*Edges only*	1	2.6%
>75%	1	2.6%	*On face*	2	5.1%
			All over	27	69.2%
Evidence of blank dimensions? (n=39)			Edge Position (n=39)		
No	5	12.8%	*All round*	0	0.0%
1 dimension	18	46.2%	*All edges sharp, dull butt*	14	35.9%
2 dimension	16	41.0%	*Most edges sharp, dull butt*	15	38.5%
			One sharp edge, dull butt	4	10.2%
Butt working (n=39)			*Irregular*	1	2.6%
Unworked	9	23.1%	*Most edges sharp, sharp butt*	1	2.6%
Partially worked	28	71.8%	*One sharp edge, sharp butt*	0	0.0%
Fully worked	2	5.1%	*Tip only*	4	10.2%
Length of cutting edge (n=39)			Scar Count (n=39)		
Min	8	-	*Min*	6	-
Max	37	-	*Max*	30	-
Mean	21.8	-	*Mean*	16.7	-

Table 5.4.11 Technological observations for handaxes from Latamne "Living floor" (data for 1961/1962 and 1964 collections combined).

The handaxes tend to be relatively large, with an average maximum length of 143.1 mm. In terms of shape, the collections are dominated by points (see figure 5.4.14) and most are produced by hard hammer working (91.3%), displaying low levels of refinement (see figure 5.4.15). All retain some cortex, while over half (56.4%) possess remnants on more than 25%

of their surface. In most cases (69.2%) the cortex is located all over the artefact. Given these low levels of refinement and high levels of cortex retention, it is likely that the relatively high number of flake scars evident on the handaxes (average = 16.7) is simply a reflection of their size. Working on the Latamne handaxes is focussed on the edges (see table 5.4.11), but not on the butts which, on all but two examples, are unworked or only partially flaked. Since most handaxes retain a lot of cortex, it is possible to infer the form of the blank from which most were produced in at least one (87.2%), and frequently two (41.0%) dimensions. In the majority of cases this was a tabular nodule (see table 5.4.7) which, judging by the size of the handaxes, would have been roughly the same size and shape as a house brick. Almost half of the handaxes studied (41.0%) retain enough cortex to assess both the width and thickness of the original nodule and it can therefore be suggested that the knappers of these examples did not modify the nodules much beyond their original form.

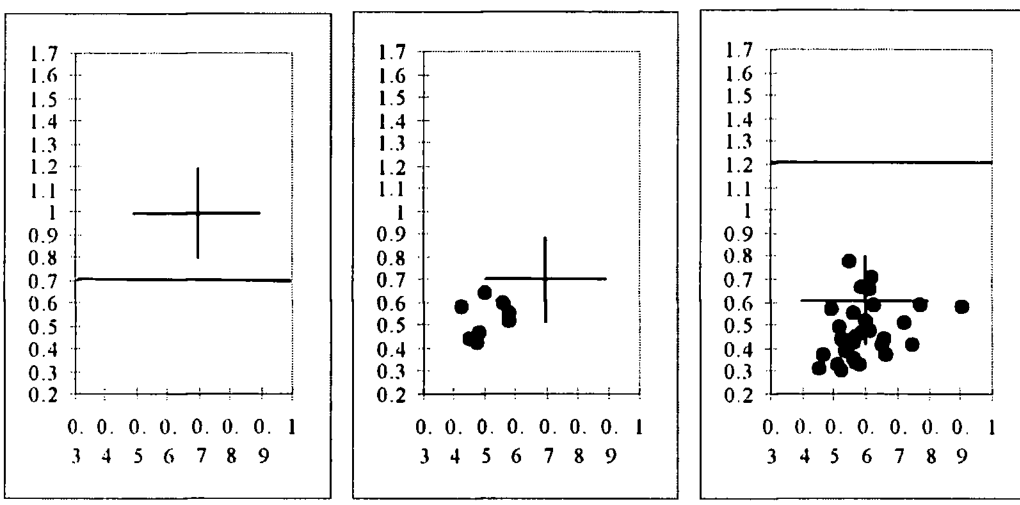

Figure 5.4.14 Tripartite diagrams for all whole handaxes studied from Latamne "Living floor" site (n=39 - data for 1961/ 1962 and 1964 collections combined).

Analysis of the selected handaxes from the 1961/1962 and 1964 excavations at the Latamne "Living floor" site presents a remarkably homogenous picture. The handaxes tend to be pointed, show low levels of refinement, high cortex retention and generally display working concentrated on the edges and at the tip. This consistent picture probably reflects the influence of the raw material used by the knapper and the reduction technique employed. The "brick shaped" blocks would have heavily constrained the knapper, and a hard hammer was arguably necessary to begin to flake them at all. Consequently, alternate hard hammer flaking from right angled edges necessitates the removal of thick flakes biting into the volume of the blank, resulting in the production of a pointed endproduct.

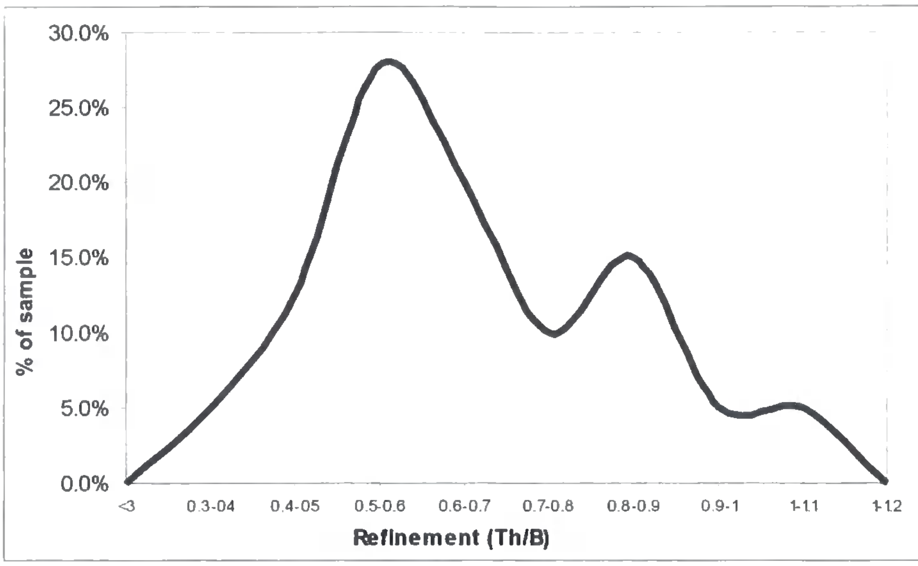

Figure 5.4.15 Levels of refinement for all whole handaxes studied from Latamne "Living floor" site (n=39 - data for 1961/ 1962 and 1964 collections combined).

Constraints imposed by the use of tabular blanks could also be invoked to explain the presence of "trihedral" handaxes which have been suggested previously to characterise the Latamne "Living floor" assemblage (e.g. Clark 1966a, 46; 1967, 31). The six "trihedral" handaxes encountered in the present study are all produced on elongated tabular nodules which have been bifacially worked around the tip and edges (see figure 5.4.16). The bifacial working of these tabular blocks has left a central ridge, or an additional edge, on one face of the handaxe. Consequently, the presence of a small number of "trihedral" handaxes in the assemblage is arguably an almost inevitable bi-product of the raw material being exploited.

Figure 5.4.16 Photograph of a trihedral handaxe from the Latamne "Living floor" site.

Flakes

The flake assemblages from the 1961/1962 and 1964 "Living floor" excavations were analysed separately, but as with the cores and handaxes, no significant difference between the datasets was apparent. They are presented here as a single assemblage (see tables 5.4.12 and 5.4.13).

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	44.0	34.3	11.9
Median	41.35	31.3	11.0
Min	15.9	11.2	2.3
Max	102.7	79.5	27.8
St.Dev.	15.3	12.2	4.7

Table 5.4.12 Latamne "Living floor" flakes summary statistics (n=558, fragments excluded; data for 1961/1962 and 1964 collections combined).

Flakes; technological observations (n=771)					
Portion (n=771)			Dorsal scars (n=558)		
Whole	558	72.4%	0	37	6.6%
Proximal	51	6.6%	1	104	18.7%
Distal	107	13.9%	2	154	27.6%
Mesial	13	1.7%	3	138	24.7%
Siret	42	5.4%	4	58	10.4%
			5	35	6.3%
			>5	32	5.7%
Dorsal cortex retention (n=558)			Dorsal scar pattern (n=558)		
100%	32	5.8%	*Uni-directional*	168	30.1%
>50%	56	10.1%	*Bi-directional*	46	8.2%
<50%	317	57.0%	*Multi-directional*	312	55.9%
0%	151	27.1%	*Wholly cortical*	32	5.8%
Butt type (n=771)			Hammer mode (n=771)		
Plain	374	48.5%	*Hard*	750	97.3%
Dihedral	34	4.4%	*Soft*	13	1.7%
Cortical	95	12.3%	*Indeterminate*	8	1.0%
Natural (but non-cortical)	1	0.1%			
Marginal	33	4.3%	Relict core edge(s) (n=558)		
Mixed	20	2.6%	*Yes*	147	26.3%
Soft hammer	7	0.9%	*No*	411	73.7%
Obscured	58	7.5%			
Missing	149	19.3%			

Table 5.4.13 Technological observations for flakes from Latamne "Living floor" (data for 1961/1962 and 1964 collections combined).

The vast majority of the flakes studied are the product of hard hammer percussion (97.3%). However, 13 soft hammer flakes, probably associated with the small number of soft hammer handaxes (see above) were encountered. None of the flakes in the collections studied display evidence of deliberate platform modification. Dorsal scar numbers tend to be low, with the vast majority of flakes (77.6%) retaining less than four previous removals. These relatively low scar counts are in line with the simple reduction strategies which characterise both core and handaxe working at the site (see above).

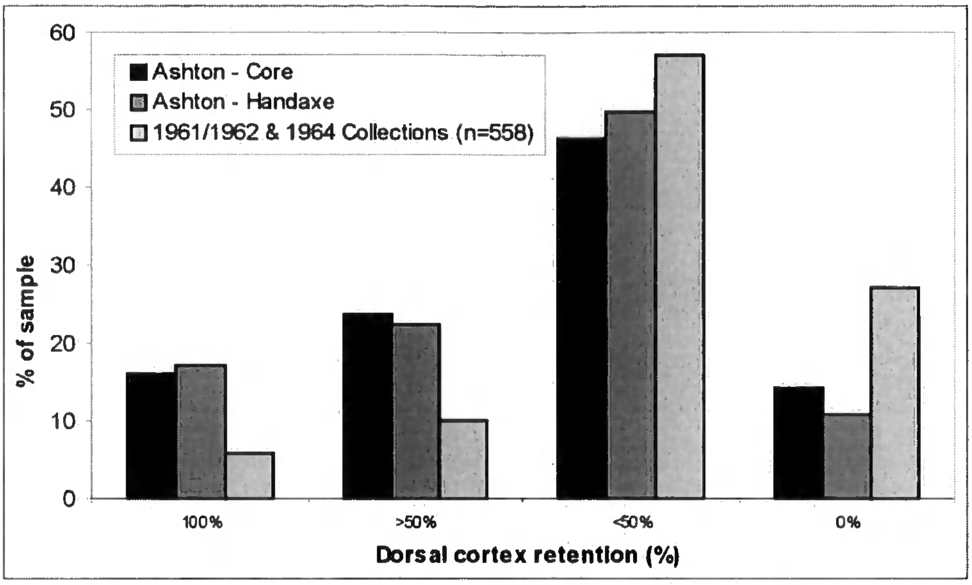

Figure 5.4.17 Comparison of percentage dorsal cortex retention on whole flakes from 1961/1962 and 1964 Latamne "Living floor" excavations (combined sample), and experimental data generated by Ashton (1998b) for core and handaxe reduction.

As both the cores and handaxes from the assemblages studied retain high levels of cortex, it is perhaps not surprising that 72.9 % of the whole flakes encountered possess some cortex on their dorsal face. However, there is a general lack of fully cortical flakes, as well as those that retain cortex on >50% of their dorsal surface (see table 5.4.13). The under-representation of such flakes is particularly noticeable when compared with Ashton's (1998b) experimental data for cortex retention on flakes produced by core and handaxe reduction (figure 5.4.17). As the "Living floor" material appears to represent minimally disturbed knapping scatters (see above), it is difficult to see how taphonomic factors could account for this lack of cortical flakes. Consequently, the evidence suggests that primary decortication of nodules was not carried out in the immediate area of the 1961/1962 and 1964 excavations. This might indicate that nodules were brought into the site in a partially decorticated state, perhaps having been obtained from the limestone scarp ~120 m north-west of the excavated area (see above). However, it is also possible that primary decortication of chert/flint blocks was carried out in an adjacent, but unexcavated, area of the Latamne "Living floor" site.

Retouched Tools

Twenty-five retouched flakes were identified amongst the selected artefacts from the 1961/1962 and 1964 excavations. The nature and position of the retouch on these artefacts are presented in table 5.4.14. No particular pattern is apparent, the flakes seemingly being retouched in a fairly *ad hoc* manner.

Nature of retouch on modified flakes (n=25)			
Position		Location	
Direct	21	*Proximal*	3
Inverse	3	*Distal*	3
Bifacial	1	*One lateral edge*	14
		Both lateral edges	1
		Continuous, except butt	2
		Continuous	2
Distribution		Edge form	
Continuous	14	*Convex*	10
Discontinuous	1	*Concave*	2
Partial	1	*Denticulate*	3
Isolated removal	9	*Flaked flake*	9
		Other	1
Extent of retouch		Angle of retouched edge	
Marginal	1	*Abrupt*	14
Minimally invasive	5	*Semi abrupt*	11
Semi-Invasive	6	*Low*	0
Invasive	13		
Regularity of retouched edge		Morphology of retouch	
Regular	14	*Scaly*	2
Irregular	2	*Stepped*	4
Single removal	9	*Parallel*	7
		Sub-parallel	3
		Single removal	9

Table 5.4.14 Nature of retouch on modified flakes from Latamne "Living floor" excavations (data for 1961/1962 and 1964 collections combined).

Technology and Hominin Behaviour

Analysis of the artefacts from the Latamne "Living floor" site indicates the presence of minimally disturbed knapping scatters focussed within a river channel. As such, the material provides direct evidence of chert/flint working practices at a particular Middle Pleistocene locale. No evidence for other activities, such as the processing of animal remains, can be inferred from the Latamne evidence, as faunal material is largely absent. Equally, the number of activity episodes and the period of time represented by the "Living floor" material are unclear. The artefacts recovered could potentially represent a single event, or an accumulation of material at a favoured place in the landscape over an unspecified period.

Although minimally disturbed, the primary context lithic material recovered from the site reflects only partial knapping sequences, with the initial decortication of chert/flint nodules occurring away from the excavated area. The distances involved in this separation of the *chaîne opératoire* are likely to have been measurable in metres, rather than kilometres, with the roughing out of chert/flint nodules being carried out in either an adjacent, but unexcavated, area of the site, or perhaps even at a limestone scarp located ~120 m north-west of the excavated area.

Core working at Latamne is characterised by simple alternate knapping sequences, apparently geared towards the production of medium-sized flakes. In general, it appears that once such flakes could no longer be obtained from a particular core, it was discarded. The few flake tools identified amongst the material studied seem to have been produced on an *ad hoc* basis. The handaxes from Latamne are characterised as large, fairly unrefined pointed forms produced through hard hammer working of tabular chert/flint blocks. The use of this tabular raw material appears to have had a significant influence on the shape of the handaxes from the site, although the choice of a hard hammer was also arguably a contributing factor. The form of the handaxes found at Latamne can therefore be seen as the combined result of raw material affordances and hominin technological decision making, rather than, as has previously been suggested, a product of chronological or cultural affinities (e.g. Copeland and Hours 1993, 91).

5.5 Gharmachi 1

Location & History of Investigation

The site of Gharmachi 1 is located ~7 km south of the Latamne "Living floor" site (see figure 4.2.1) and was discovered in October 1977 during the CNRS survey of the Pleistocene geology and archaeology of the Orontes Valley (see chapter four, section 4.2). The site is located in an area known locally as Friwan, on a spur of land adjacent to the Wadi Gharmachi (Copeland and Hours, 1993, 74; see figure 5.5.1). The 1977 investigations recovered 265 artefacts, including 40 handaxes, from the modern landsurface, which was underlain in places by Orontes fluvial deposits (Muhesen 1985, 48). Subsequently, Francis Hours and Sultan Muhesen undertook two seasons of excavation (1979 and 1981), recovering over 2,000 further artefacts from both the excavations and the landsurface itself (Hours 1980, Muhesen 1985; 1993).

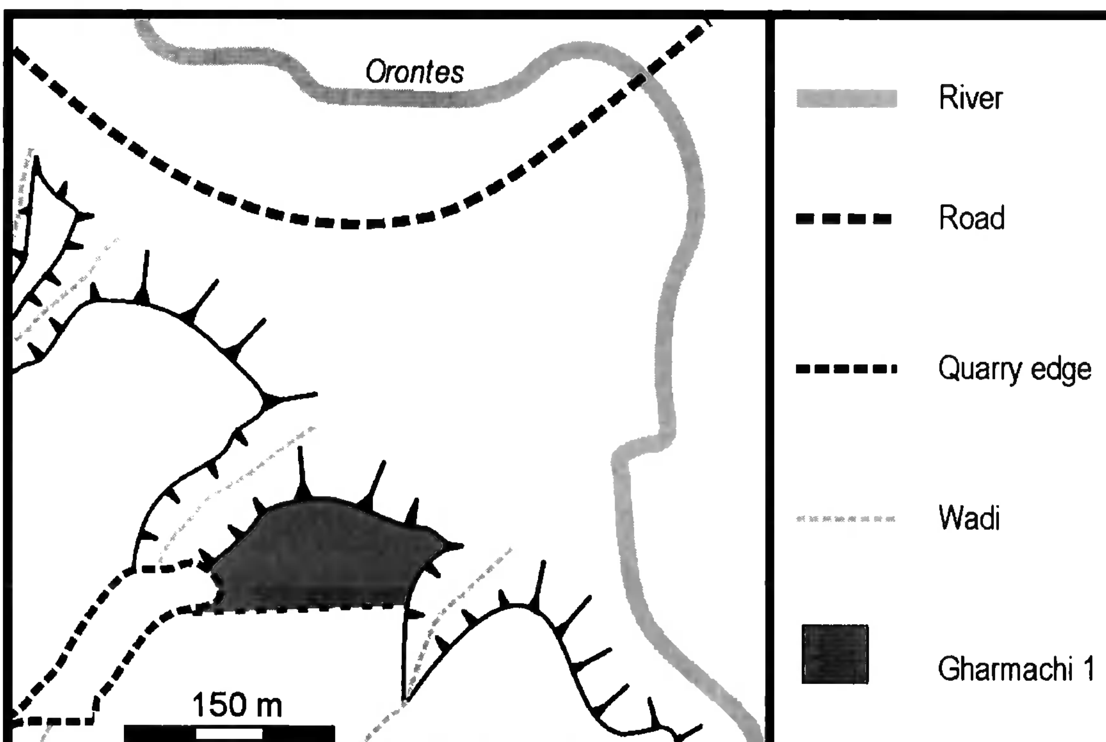

Figure 5.5.1 Location map illustrating position of Gharmachi 1.

The 1979 fieldwork involved random sampling of the area from which artefacts had been recovered in 1977. This was achieved through the excavation of seventeen sondages (Hours 1980, 90). The sondages were expanded where artefacts were encountered (Hours 1980, 91), and an area totalling 237 m^2 was excavated (Muhesen 1985, 49; see figure 5.5.2). Sondages 1, 2, 14 and 17 were excavated to a depth of up to 1 m (Muhesen 1985, 45), but most were less than 40 cm in depth. Artefacts were only encountered in pits located above fluvial gravels; no material was recovered from excavations located away from fluvial deposits (Hours 1980, 91, Muhesen 1985, 49). The material was primarily distributed in two areas;

the first locality encompassed Sondages 6, 7 and 8, while the second comprised Sondages 15 and 16 (Hours, 1980, 94, Muhesen 1985, 49). In 1981 Hours and Muhesen returned to Sondages 8, 7 and 6, expanding them to form Square A (85m^2), Square B (95 m^2) and Square D (90 m^2) respectively (Muhesen 1985, 49; see figure 5.5.2). All were excavated to a depth of approximately 30 cm below the ground surface (Muhesen 1985, 50). During the 1981 excavation artefacts were also observed eroding from the fluvial gravels exposed in Wadi Gharmachi (Besançon *et al.* 1978b, 167, Copeland and Hours 1993, 74).

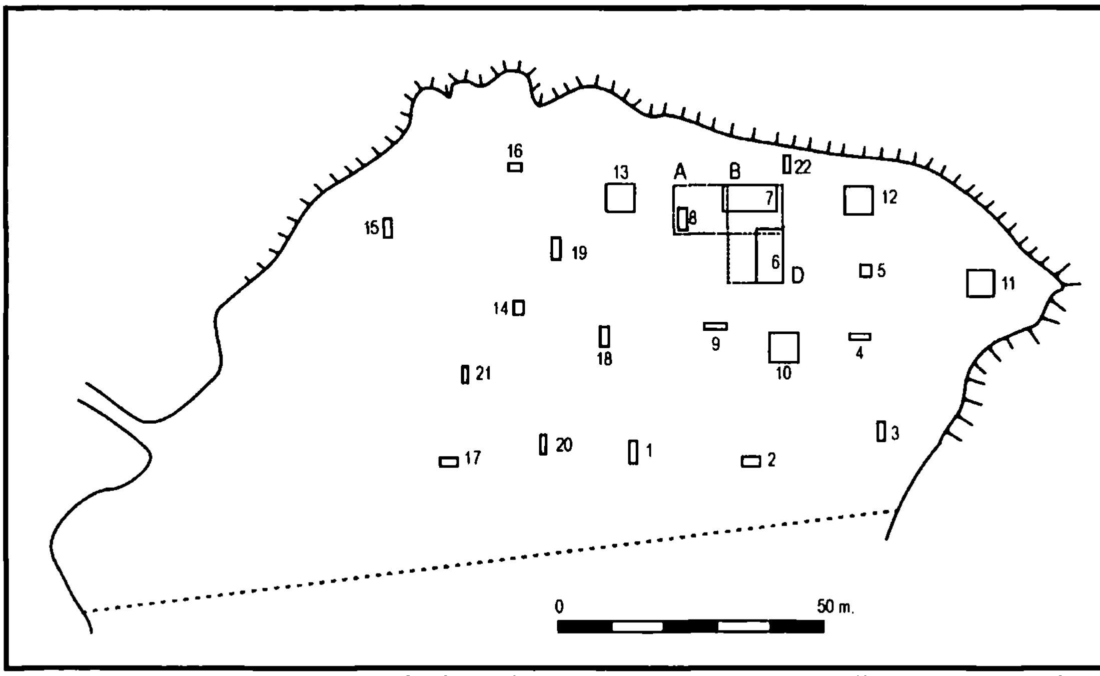

Figure 5.5.2 Composite ground plan of Gharmachi 1 excavations illustrating the relative position of sondages investigated in 1979 and areas opened up in 1981 (based on Hours 1981 and Muhesen 1985).

The excavated material recovered during the two seasons of excavation at Gharmachi 1 was divided by the excavators into four series; A, B, C and D (Hours 1980, 93, Muhesen 1985; 1993). Series C and D were recovered from the landsurface and a Holocene soil (Muhesen 1985, 51) and are not considered here. Series A and B were both recovered from the surface and upper part of the fluvial gravels, but were differentiated primarily on the basis of artefact (in particular handaxe) typology, and to a lesser extent staining and condition (Hours 1980, 93, Muhesen 1985, 50). The series B material was interpreted as more typo-technologically "advanced" than series A. Handaxes assigned to series A were argued to resemble many of those from the Latamne "Living floor" site, being large, relatively thick and pointed (Hours 1980, 93; see section 5.4); those assigned to series B are often ovoid or amygdaloidal in planform, and were argued to possess more evidence of secondary edge modification (Hours 1980, 93, Muhesen 1985, 50; 1993 147, Copeland and Hours 1993. 104), as well as encompassing forms regarded as exclusively Middle Palaeolithic in date (Hours 1980, 93).

Thirteen cores and five flakes recovered during the two excavations were described as the products of Levallois reduction and assigned to series B (Muhesen 1985, 73). Additionally, artefacts belonging to series A are described as red/brown in colour, whereas those from series B are noted as brown (Muhesen 1985, 50). Artefacts from series A are also said to be rolled, while those from series B are described as less abraded (Muhesen 1985, 50).

Geological Background & Preferred Dating

The stratigraphic sequence associated with the Gharmachi 1 locale was exposed in the adjacent Wadi Gharmachi and consists of a marl bench overlain by up to 15 m of calcreted fluvial gravels, which are truncated and sealed by a Holocene soil (Hours 1980, 90, Copeland and Hours 1993, 94; see figure 5.5.3). In the excavated areas the soil was no more than 30 cm deep where it overlay gravel (Muhesen 1985, 50). The fluvial deposits at Gharmachi 1 are located approximately 30 m above the present Orontes (Muhesen 1985, 48: 1993, 145). The gravels have been assigned to the Qf III formation of the Orontes (Besançon and Sanlaville 1993, 31), and have been directly correlated with those at Latamne (Hours 1980, 92). This suggests a date of MIS 12/11 for the Gharmachi 1 fluvial deposits (see chapter four section 4.3 and section 5.4 of this chapter).

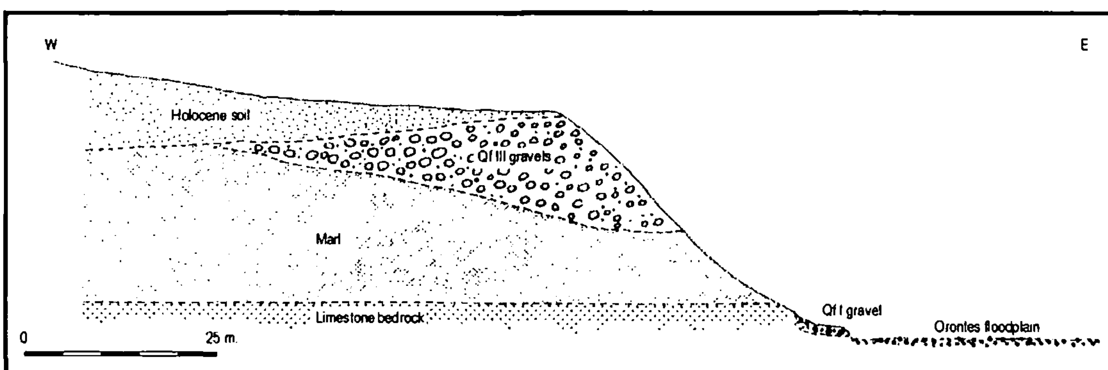

Figure 5.5.3 Schematic section drawing illustrating deposits present in the immediate vicinity of Gharmachi 1 (after Muhesen 1985). Note that in the areas excavated the Holocene soil overlying the fluvial gravels did not exceed a depth of 30 cm.

Excavated artefacts (assigned to series A and B) were recovered from the truncated surface, and within the uppermost part, of the Gharmachi 1 gravels (Hours 1980, 91, Muhesen 1985, 50). However, only the material assigned to series A was interpreted by the excavators as being directly associated with the fluvial deposits, whereas the series B artefacts were suggested to have been discarded on top of the truncated gravels (Hours 1980, 92, Muhesen 1985, 50). In order to assess the validity of the proposed temporal and spatial division between the series A and series B material from Gharmachi 1, the taphonomic history of the artefacts (as indicated by their condition state) has been considered (tables 5.5.1 and 5.5.2). Since just six artefacts excavated in 1981 and assigned to series A could be identified, only observations relating to material recovered during the 1979 fieldwork are presented. Futhermore, as only three handaxes in the 1979 collection studied were assigned to series A, only flakes and cores are analysed.

Cores from Gharmachi 1; series A (n=34) and series B (n=181)									
	Series A		Series B			Series A		Series B	
Unabraded	4	11.8%	58	32.0%	*No edge damage*	2	5.9%	14	7.8%
Slightly abraded	11	32.3%	72	39.8%	*Slight edge damage*	6	17.6%	71	39.2%
Moderately abraded	15	44.1%	46	25.4%	*Moderate edge damage*	21	61.8%	84	46.4%
Heavily abraded	4	11.8%	5	2.8%	*Heavy edge damage*	5	14.7%	12	6.6%
Unstained	0	0.0%	1	0.6%	*Unpat.*	0	0.0%	1	0.6%
Lightly stained	4	11.8%	14	7.7%	*Lightly patinated*	0	0.0%	11	6.0%
Moderately stained	30	88.2%	25	13.8%	*Moderately patinated*	34	100%	169	93.4%
Heavily stained	0	0.0%	141	77.9%	*Heavily patinated*	0	0.0%	0	0.0%
Unscratched	31	91.2%	147	81.2%					
Lightly scratched	3	8.8%	30	16.6%					
Moderately scratched	0	0.0%	2	1.1%					
Heavily scratched	0	0.0%	2	1.1%					

Table 5.5.1 Condition of cores studied from 1979 excavations at Gharmachi 1 according to series nomenclature of Hours (1981) and Muhesen (1985; 1993).

The condition of cores and flakes assigned to series A and B in the 1979 collection is varied, but consistent between the two collections (see tables 5.5.1 and 5.5.2). The only noticeable difference between the two relates to the level of abrasion, series B containing proportionally more unabraded flakes and cores (44.00% and 32.00%) than series A (20.56% and 11.76%). However, the significance of this is debatable, as both series contain significant numbers of unabraded/slightly abraded artefacts as well as more clearly derived pieces. Consequently, there is no clear division between the two collections in terms of condition state. This, along with the fact that the published data indicates that both the series A and series B artefacts come from broadly the same stratigraphic position (on top of and within uppermost Gharmachi 1 gravels) suggests that series attribution cannot be used to divide the artefacts into material from two separate contexts. Consequently, the material has been amalgamated here as a single collection of artefacts recovered from surface and the uppermost portion of the fluvial deposits. The condition of the artefacts has then been used as a means to assess the original context of the artefacts.

Flakes from Gharmachi 1; Series A (n=107) and Series B (n=548)									
	Series A		Series B			Series A		Series B	
Unabraded	22	20.6%	241	44.0%	*No edge damage*	0	0.0%	30	5.5%
Slightly abraded	32	29.9%	192	35.0%	*Slight edge damage*	20	18.7%	251	45.8%
Moderately abraded	41	38.3%	107	19.5%	*Moderate edge damage*	65	60.7%	201	36.7%
Heavily abraded	12	11.2%	8	1.5%	*Heavy edge damage*	22	20.6%	66	12.0%
Unstained	1	1.0%	28	5.1%	*Unpat.*	0	0.0%	37	6.8%
Lightly stained	3	2.8%	63	11.5%	*Lightly patinated*	9	8.4%	144	26.3%
Moderately stained	10	9.3%	102	18.6%	*Moderately patinated*	96	89.7%	358	65.3%
Heavily stained	93	86.9%	355	64.8%	*Heavily patinated*	2	1.9%	9	1.6%
Unscratched	93	86.9%	506	92.3%					
Lightly scratched	10	9.3%	20	3.6%					
Moderately scratched	4	3.7%	22	4.0%					
Heavily scratched	0	0.0%	0	0.0%					

Table 5.5.2 Condition of flakes studied from 1979 excavations at Gharmachi 1 according to series nomenclature of Hours (1981) and Muhesen (1985; 1993).

The moderately and heavily abraded artefacts from Gharmachi 1 are clearly derived from the gravels found at the site. Futhermore, given that artefacts occur only where gravel is present (Hours 1980, 91, Muhesen 1985, 49), the less abraded element would also appear to be associated with the gravel to some degree. This could mean that these artefacts were deposited on the truncated surface of the gravel, or are derived from a fine-grained horizon within the gravel. Either option is equally plausible. Consequently, as things stand only the fluvially transported material can definitely be associated with the fluvial gravels found at Gharmachi 1. This suggests a minimum age of MIS 12/11 for the moderately and heavily abraded artefacts (see above). Unfortunately, however, the less abraded element is essentially undated; it may be contemporary with the fluvial deposits at the site, or it may have been deposited later.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	1979 collection		1981 collection	
	No. of artefacts	% of total	No. of artefacts	% of total
Cores	215	23.1%	82	35.0%
Handaxes	61	6.6%	13	5.6%
Flakes	649	69.7%	133	56.8%
Flake tools	6	0.6%	6	2.6%
Total	931	100%	234	100%

Table 5.5.3 Material analysed from Gharmachi 1.

All the artefacts analysed from Gharmachi 1 are stored in the National Museum, Damascus. In order to maximise the stratigraphic integrity of the material studied, this investigation focussed on extant artefacts recovered during the 1979 and 1981 excavations at the site (table 5.5.3). The study was limited to artefacts from the two excavations marked as belonging to either series A or B, and as being from a sondage/square, in order to exclude material collected from the surface. Artefacts assigned by the excavators to series A and series B are considered here as part of the same assemblage (see above). Material recovered from the ground surface during the 1977 survey work has been excluded from the current analysis, as have any artefacts recovered during the two excavations labelled as belonging to Series C and D (i.e. artefacts from either the Holocene soil or the modern landsurface - see above).

	1979 Excavation - Series B			1981 Excavation - Series B		
	Surface	Excavated	Artefacts studied	Surface	Excavated	Artefacts studied
Non-Levallois cores	44*	223	181	108	84	80
Levallois cores	0*	9	0	0	4	0
Handaxes	15*	50	58	13	15	13
Non-Levallois flakes	213*	307	548	426	122	135
Levallois flakes	0*	3	0	0	0	0
Retouched tools	25*	35	6	83	37	6
Total	297	627	793	630	262	234

*Table 5.5.4 Comparison between number of artefacts studied labelled as belonging to series B from the 1979 and 1980 excavations at Gharmachi 1 and published counts of excavated and surface collected material (original counts taken from Muhesen 1985 table 4, 52 and table 12, 65; however, figures suffixed with * are minimum counts as only surface counts from sondages 6 and 7 are available from the 1979 excavations).*

Despite this caution it has not been possible to use artefact markings to distinguish between surface and excavated material recovered during the 1979 fieldwork. As table 5.5.4 illustrates, artefacts labelled as belonging to series B from cuttings made in 1979 include both surface and excavated material (no published figures are available for material assigned to series A during the 1979 fieldwork, although presumably the same mixing exists for this material). Consequently, the extant artefact assemblage from the 1979 excavation has been treated here as a spatially restricted surface collection. Fortunately artefact markings on the material recovered during the 1981 excavation at Gharmachi 1 can be distinguished from pieces collected from the modern landsurface (see table 5.5.4), although some limited admixture of material cannot be ruled out.

Taphonomy of lithic assemblage

Cores from Gharmachi 1 (n=297)									
	1979 collection		1981 excavated collection			1979 collection		1981 excavated collection	
Unabraded	62	28.8%	20	24.4%	*No edge damage*	16	7.4%	17	20.7%
Slightly abraded	83	38.6%	40	48.8%	*Slight edge damage*	77	35.8%	35	42.7%
Moderately abraded	61	28.4%	22	26.8%	*Moderate edge damage*	105	48.8%	30	36.6%
Heavily abraded	9	4.2%	0	0.0%	*Heavy edge damage*	17	8.0%	0	0.0%
Unstained	1	0.4%	1	1.2%	*Unpatinated*	1	0.5%	0	0.0%
Lightly stained	18	8.4%	7	8.5%	*Lightly patinated*	11	5.1%	3	3.7%
Moderately stained	55	25.6%	6	7.3%	*Moderately patinated*	203	94.4%	76	92.6%
Heavily stained	141	65.6%	68	83.0%	*Heavily patinated*	0	0.0%	3	3.7%
Unscratched	178	82.8%	73	89.0%					
Lightly scratched	33	15.3%	9	11.0%					
Moderately scratched	2	0.9%	0	0.0%					
Heavily scratched	2	0.9%	0	0.0%					

Table 5.5.5 *Condition of cores studied from 1979 and 1981 fieldwork at Gharmachi 1.*

The taphonomic data recorded for the selected artefacts from the 1979 and 1981 field seasons at Gharmachi 1 suggests that both assemblages have broadly similar depositional histories (see tables 5.5.5, 5.5.6 and 5.5.7). Most are unabraded, or slightly abraded (72.7%

of artefacts from the 1979 fieldwork and 74.4% from the 1981 excavation), although a significant number of fluvially derived elements are also present (27.3% of artefacts from the 1979 fieldwork and 25.6% from the 1981 excavation). This suggests that the collections comprise both primary context material and pieces which have been transported in a river following discard.

Handaxes from Gharmachi 1 (n=74)									
	1979 collection		**1981 excavated collection**			**1979 collection**		**1981 excavated collection**	
Unabraded	16	26.2%	3	23.1%	*No edge damage*	0	0.0%	0	0.0%
Slightly abraded	29	47.5%	7	53.8%	*Slight edge damage*	19	31.1%	7	53.8%
Moderately abraded	13	21.3%	3	23.1%	*Moderate edge damage*	36	59.0%	4	30.8%
Heavily abraded	3	4.9%	0	0.0%	*Heavy edge damage*	6	9.8%	2	15.4%
Unstained	0	0.0%	0	0.0%	*Unpatinated*	0	0.0%	0	0.0%
Lightly stained	4	6.6%	1	7.7%	*Lightly patinated*	19	31.1%	0	0.0%
Moderately stained	15	24.6%	2	15.4%	*Moderately patinated*	39	64.0%	13	100.%
Heavily stained	42	68.8%	10	76.9%	*Heavily patinated*	3	4.9%	0	0.0%
Unscratched	55	90.2%	13	100%					
Lightly scratched	3	4.9%	0	0.0%					
Moderately scratched	3	4.9%	0	0.0%					
Heavily scratched	0	0.0%	0	0.0%					

Table 5.5.6 *Condition of handaxes studied from 1979 and 1981 fieldwork at Gharmachi 1.*

Most artefacts within both assemblages possess slight or moderate amounts of edge damage (1979 assemblage = 83.1%, 1981 assemblage = 76.9%), probably reflecting the combined effects of a fluvial depositional environment, curation practices and the effects of trampling - both recently (particularly in the case of the 1979 surface material) and in antiquity. Although all the material in the 1981 excavation, and most from the 1979 fieldwork, is patinated, a small number of unpatinated artefacts were identified amongst the 1979 assemblage (4.1%). As the 1979 sample contains stone tools collected from the modern landsurface (see above), it is possible that these 38 unpatinated artefacts (37 flakes and a single core) represent a later intrusive element in the collection. Consequently, these artefacts have been excluded from further analysis. Variation in the nature of their recovery probably also accounts for the fact that proportionally more artefacts in the 1979 collection display signs of surface scratching (1979 assemblage = 10.6%, 1981 assemblage = 5.1%), as this tends to occur on siliceous artefacts that have been exposed on a landsurface for a prolonged period of time (Stapert 1976).

Flakes from Gharmachi 1 (n=794)									
	1979 collection		**1981 excavated collection**			**1979 collection**		**1981 excavated collection**	
Unabraded	263	40.2%	48	34.5%	*No edge damage*	30	4.6%	23	16.6%
Slightly abraded	224	34.2%	56	40.3%	*Slight edge damage*	271	41.4%	61	43.9%
Moderately abraded	148	22.6%	31	22.3%	*Moderate edge damage*	266	40.6%	43	30.9%
Heavily abraded	20	3.0%	4	2.9%	*Heavy edge damage*	88	13.4%	12	8.6%
Unstained	29	4.4%	5	3.6%	*Unpatinated*	37	5.6%	0	0.0%
Lightly stained	66	10.1%	4	2.9%	*Lightly patinated*	153	23.4%	15	10.8%
Moderately stained	112	17.1%	17	12.2%	*Moderately patinated*	454	69.3%	124	89.2%
Heavily stained	448	68.4%	113	81.3%	*Heavily patinated*	11	1.7%	0	0.0%
Unscratched	599	91.5%	136	97.8%					
Lightly scratched	30	4.5%	3	2.2%					
Moderately scratched	26	4.0%	0	0.0%					
Heavily scratched	0	0.0%	0	0.0%					

Table 5.5.7 Condition of flakes studied from 1979 and 1981 fieldwork at Gharmachi 1.

In order to assess whether or not the minimally derived component of the Gharmachi 1 assemblages are reflective of primary context accumulations, the size distribution of the flakes in unabraded or only slightly abraded condition has been compared with Schick's (1986) data produced during experimental non-prepared core reduction (figure 5.5.4). As the deposits encountered during the two excavations were not sieved (Muhesen 1985, 76), artefacts under 2 cm in maximum dimension have been excluded from this comparison, as even if such material existed, it is unlikely to have been recovered. Although pieces under 4 cm are under-represented in both collections, the data demonstrates a good fit with the experimental results and may suggest that primary context material exists amongst the Gharmachi 1 collections.

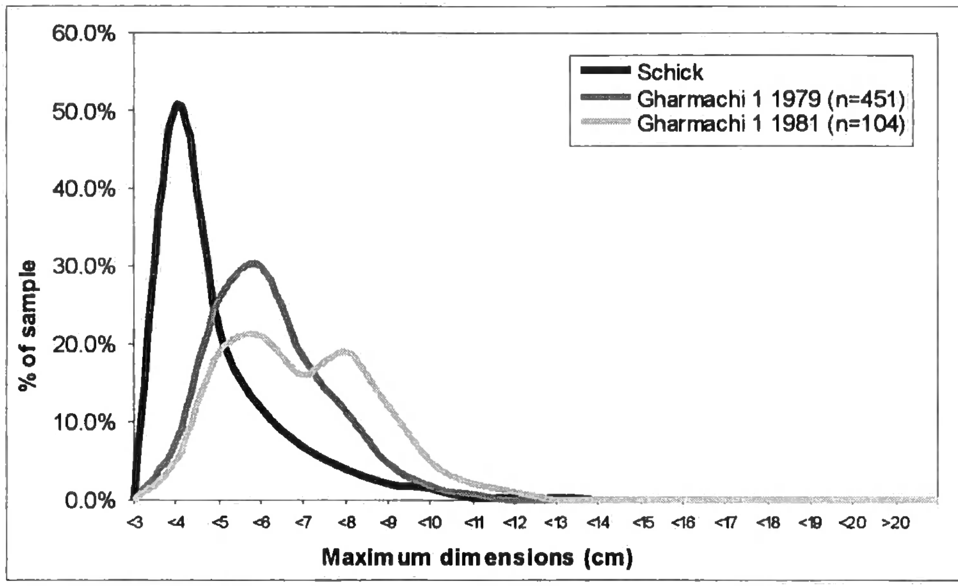

Figure 5.5.4 Comparison of maximum dimension of debitage larger than 2 cm recovered during 1979 and 1981 fieldwork at Gharmachi 1, and experimental data generated by Schick (1986).

Technology of lithic assemblage

Raw Material

	Cores (n=296)	Handaxes (n=74)	Flakes (n=757)
Raw material			
Fresh	18.2%	9.5%	12.7%
Derived	57.4%	45.9%	39.9%
Indeterminate	24.3%	44.6%	47.4%
Blank form			
Nodule (Rounded)	43.9%	32.4%	-
Nodule (Tabular)	2.7%	4.1%	-
Shattered Nodule	14.9%	1.4%	-
Flake	2.0%	6.8%	-
Thermal flake	0.0%	0.0%	-
Indeterminate	36.5%	55.4%	-

Table 5.5.8 Raw material and inferred blank form for artefacts studied from Gharmachi 1 (data for 1979 and 1981 collections combined).

Most artefacts studied from the 1979 and 1981 Gharmachi 1 collections were produced on coarse-grained chert/flint blanks; however, four quartzite flakes from the 1979 fieldwork were also recorded. Table 5.5.8 illustrates the raw material source and inferred blank form of artefacts from the two assemblages. Many of the blanks used to produce the artefacts are from a derived source (44.9%; combined figure), while a smaller number (13.9%; combined figure) are fashioned from blanks which retained fresh chalky cortex. The source of the derived raw material is likely to have been the gravel deposits with which the artefacts are associated (Muhesen 1985, 60). The blanks with fresh chalky cortex, on the other hand, have originated from a primary chert/flint source. This does not necessarily imply that fresh raw material and/or the artefacts themselves were brought into the site over any great distance, as the raw material could have been sourced from the chalky limestone which is widespread in the local area. Furthermore, the presence of concentrations of sizable blocks in the top of the Gharmachi 1 gravels (Muhesen 1985, 74; 1993, 148) suggests that outcrops of chert/flint rich limestone were present in the immediate vicinity of the site (*cf.* Latamne "Living floor" site; see section 5.4). Rounded nodules were most frequently exploited (41.6%; combined figure) in the reduction of the cores and handaxes studied.

Core Working

	Maximum dimensions (mm)		**Weight (grams)**	
	Fresh/slightly abraded (n=193)	**Moderately/ heavily abraded (n=89)**	**Fresh/slightly abraded (n=193)**	**Moderately/ heavily abraded (n=89)**
Mean	77.5	84.4	280.8	329.4
Median	76.6	79.4	228.5	243.0
Min	40.0	42.9	25.1	23.0
Max	175.2	174.4	1834.4	1314.0
St.Dev.	23.3	24.4	246.7	255.1

Table 5.5.9 Gharmachi 1 cores summary statistics (fragments excluded; 1979 and 1981 collections combined).

Cores (fresh/slightly abraded); technological observations (n=204)					
Overall core reduction (n=204)			Core episodes (n=672)		
Migrating platform	180	82.2%	*Type A: Single Removal*	28	6.1%
Single platform unprepared	5	2.5%	*Type B: Parallel flaking*	72	15.6%
Discoidal	7	3.4%	*Type C: Alternate flaking*	213	46.2%
Fragment/Obscured	12	5.9%	*Type D: Unattributed removal*	148	32.1%
Flake scars/core (n=192)			Core episodes/core		
1-5	56	29.2%	*Min*	1	-
6-10	86	44.8%	*Max*	13	-
11-15	38	19.8%	*Mean*	2.5	-
>15	12	6.3%			
Max	28	-	Flake scars/core episode		
Mean	8.3	-	*Min*	1	-
			Max	20	-
% Cortex (n=192)			*Mean*	3.5	-
0	16	8.3%			
>0-25%	50	26.0%	Blank form retained? (n=192)		
>25-50%	65	33.9%	*Yes*	143	51.0%
>50-75%	47	24.5%	*No*	130	49.0%
>75%	14	7.3%			

Table 5.5.10 Technological observations for cores in fresh/slightly abraded condition from Gharmachi 1 (data for 1979 and 1981 collections combined).

In order to assess whether technological differences are apparent between the minimally disturbed and re-worked cores from Gharmachi 1 they have been analysed separately. Notably however, no major differences are apparent (see tables 5.5.9, 5.5.10 and 5.5.11).

Furthermore, the technological attributes of the Gharmachi 1 cores are broadly comparable to those observed from the Latamne "Living floor" site (see section 5.4). As is the case with Latamne cores, those from Gharmachi 1 tend to be medium-sized (average maximum dimension = 79.7 mm and an average weight = 296.2 grams; all cores combined) migrating platform cores (89.2%; all cores combined), the working of which seems to have been fairly intensive (average of 7.9 flake scars per core; all cores combined), but not deliberately prolonged (only 4.7% possess more than 15 flake scars; all cores combined). The latter impression is reinforced by the high cortex retention on the cores (65.8% retain more than 25 % of their original cortex; all cores combined) and the fact that the original blank form can often be inferred (68.0%; all cores combined). This implies that, in general, core working at Gharmachi 1 was not prolonged past the point at which medium flakes were obtainable. A similar pattern is also apparent at Latamne (see section 5.4).

Cores (moderately/heavily abraded); technological observations (n=92)					
Overall core reduction (n=92)			Core episodes (n=216)		
Migrating platform	84	91.3%	*Type A: Single Removal*	11	5.1%
Single platform unprepared	5	5.4%	*Type B: Parallel flaking*	36	16.7%
Discoidal	0	0.0%	*Type C: Alternate flaking*	91	42.1%
Fragment	3	3.3%	*Type D: Unattributed removal*	78	36.1%
Flake scars/core (n=89)			Core episodes/core		
1-5	32	36.0%	*Min*	1	-
6-10	42	47.2%	*Max*	13	-
11-15	14	15.7%	*Mean*	2.5	-
>15	1	1.1%			
Max	16	-	Flake scars/core episode		
Mean	7.1	-	*Min*	1	-
			Max	15	-
% Cortex (n=273)			*Mean*	2.8	-
0	9	10.1%			
>0-25%	21	23.6%	Blank form retained? (n=89)		
>25-50%	30	33.7%	*Yes*	48	53.9%
>50-75%	25	28.1%	*No*	41	46.1%
>75%	4	4.5%			

Table 5.5.11 Technological observations for cores in moderately/heavily abraded condition from Gharmachi 1 (data for 1979 and 1981 collections combined).

Despite these broad similarities in core reduction between the Latamne and Gharmachi 1 samples, two notable differences are apparent; the average number of flake scars per core episode tend to be lower at Gharmachi 1 (Gharmachi 1 = 3.4; all cores combined, Latamne "Living floor" = 5.5), while the mean number of core episodes per core is slightly higher (Gharmachi 1 = 2.5; all cores combined, Latamne "Living floor" = 1.7). This indicates that core reduction at Gharmachi 1 generally involved more episodes than at Latamne, but that these episodes tended to be less intensive. These slight variations in core reduction strategies may relate to the elevated numbers of tabular blanks used at Latamne; some 34.7% of the Latamne cores formed on nodules are tabular in form, in comparison to only 5.8% of the

Gharmachi nodular core sample. Tabular blanks possess natural platforms which favour relatively extended alternate knapping sequences along their edges, until the required flaking angle is lost. Conversely, the use of rounder nodules arguably requires higher levels of platform creation and alteration, resulting in shorter, but more frequent, alternate sequences. The paucity of tabular nodules at Gharmachi is reflected, therefore, by the dominance of multiple, low intensity episodes of flake production.

Handaxes

	Length (mm)		Breadth (mm)		Thickness (mm)	
	Fresh/ slightly abraded (n=193)	Moderate/ heavily abraded (n=89)	Fresh/ slightly abraded (n=193)	Moderate/ heavily abraded (n=89)	Fresh/ slightly abraded (n=193)	Moderate/ heavily abraded (n=89)
Mean	90.8	96.2	64.0	67.1	34.3	32.5
Median	94.2	102.4	63.3	65.6	33.7	30.2
Min	53.4	61.3	38.0	46.9	18.1	23.7
Max	126.5	127.2	91.0	84.6	56.3	50.4
St.Dev.	17.6	20.8	12.5	12.0	8.2	7.5

Table 5.5.12 Gharmachi 1 handaxes summary statistics (n=61, fragments excluded; data for 1979 and 1981 collections combined).

Like the cores, the handaxes from Gharmachi 1 have been analysed as two separate groups divided according to condition state in order to assess whether technological differences are apparent between the minimally disturbed and re-worked pieces. Once again, however, no major differences are apparent (see tables 5.5.12, 5.5.13 and 5.5.14, and figures 5.5.5 and 5.5.6). The Gharmachi 1 handaxes tend to be medium-sized (see table 5.5.12). Pointed and ovate forms are present in near equal proportions (see figure 5.5.5), although the pointed examples tend towards the broader and less elongated end of the spectrum of variation recognised for such handaxes, while the ovates tend to correspond with forms that have pointed tips. Consequently, the differences in planform of the Gharmachi 1 handaxes can be seen to represent a continuum of variability for an assemblage dominated by broad, squat handaxes whose tips frequently taper towards a point.

The handaxes from Gharmachi 1 display significant variation in the method of percussion employed in their reduction (see tables 5.5.13 and 5.5.14). Examples of handaxes formed through the use of hard (28.4%; all handaxes combined), soft (44.6%; all handaxes combined) and a combination of both hard and soft (18.9%; all handaxes combined) hammer working are all present in significant numbers. The employment of soft hammer thinning on a large proportion of the handaxes from Gharmachi 1 is reflected in the relatively high levels of refinement for the handaxes from the site (figure 5.5.6), particularly in comparison to handaxes such as those from the Latamne "Living floor" site which tend to have been produced using bold, hard hammer removals. Interestingly, there is some suggestion that the levels of refinement exhibited by the Gharmachi 1 handaxes vary according to their taphonomic history, with the fluvially derived sample displaying proportionally higher levels of refinement. Arguably, this suggests that fluvially abraded handaxes can give a false impression of increased levels of refinement.

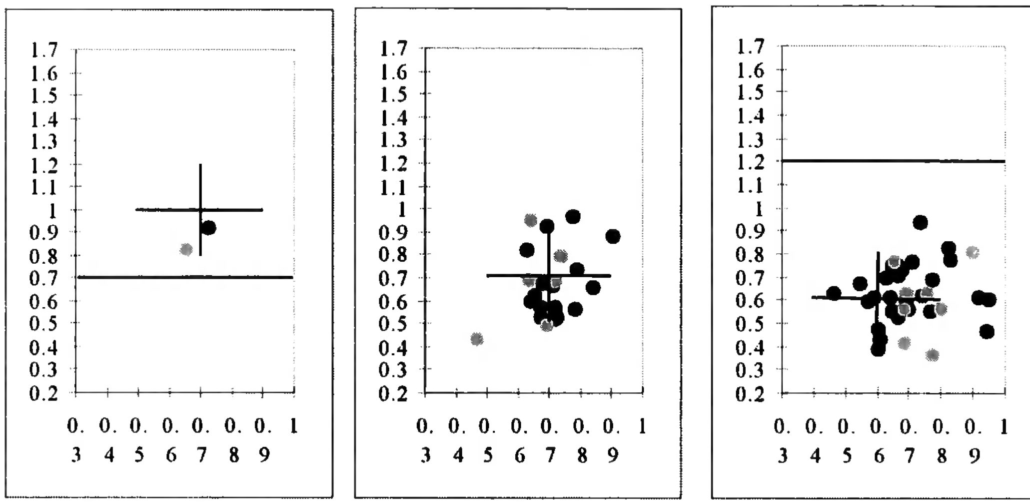

Figure 5.5.5 Tripartite diagrams for whole handaxes studied from Gharmachi 1; black= fresh and slightly abraded examples, grey = moderately and heavily abraded examples (n=60 - width of tip could not be measured for one complete handaxe due to damage; data for 1979 and 1981 collections combined).

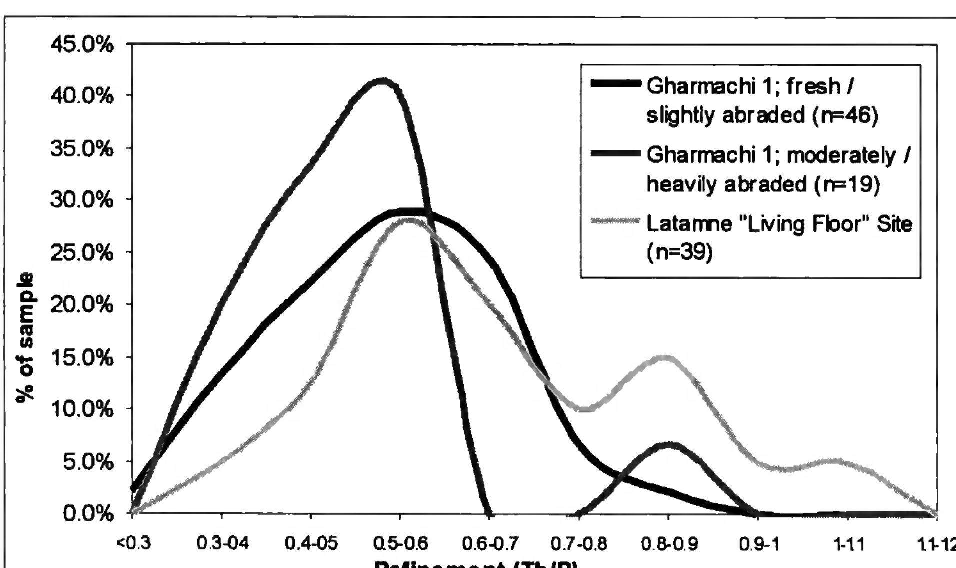

Figure 5.5.6 Levels of refinement for all whole handaxes studied from Gharmachi 1 (data for 1979 and 1981 collections combined) and the Latamne "Living floor" site (data for 1961/1962 and 1964 collections combined).

The majority of Gharmachi 1 handaxes retain some cortex on their surface (70.5%; all handaxes combined); however, only a limited number possess cortex on more than 25 % of their total surface area (24.6%; all handaxes combined). In many cases this cortex is located in patches all over the artefact (36.1%; all handaxes combined), although it also commonly restricted to the face of the handaxe (16.4%; all handaxes combined), or to the butt (14.8%; all handaxes combined). Approaching a third (32.8%) of the handaxes either retain no cortex, or possess cortex that is spatially restricted to one face. Many possess a cutting edge around their entire circumference (34.4%; all handaxes combined) and a fully worked butt (39.3%; all handaxes combined). However, handaxes which retain a minimally or unworked butt are also well represented (55.7%; all handaxes combined), together with artefacts which do not possess a continuous cutting edge (62.3%; all handaxes combined).

Handaxes (fresh/slightly abraded); technological observations (n=55)					
Portion (n=55)			Hammer mode (n=55)		
Whole	46	83.6%	*Hard*	17	30.9%
Tip	1	1.8%	*Soft*	26	47.3%
Butt	2	3.6%	*Mixed*	9	16.4%
Fragment	6	10.9%	*Indeterminate*	3	5.5%
Cortex retention (n=46)			Cortex position (n=46)		
0	6	13.0%	*None*	6	13.0%
>0-25%	23	50.0%	*Butt only*	9	19.6%
>25-50%	7	15.2%	*Butt and edges only*	0	0.0%
>50-75%	3	6.5%	*Edges only*	1	2.2%
>75%	0	0.0%	*On face*	7	15.2%
Obscured	7	15.2%	*All over*	16	34.8%
			Obscured	7	15.2%
Evidence of blank dimensions? (n=46)					
No	18	39.1%	Edge Position (n=46)		
1 dimension	9	19.6%	*All round*	15	32.6%
2 dimension	12	26.1%	*All edges sharp, dull butt*	14	30.4%
Obscured	7	15.2%	*Most edges sharp, dull butt*	4	8.7%
			One sharp edge, dull butt	4	8.7%
Butt working (n=46)			*Most edges sharp, sharp butt*	2	4.3%
Unworked	11	23.9%	*One sharp edge, sharp butt*	2	4.3%
Partially worked	16	34.8%	*Tip only*	4	8.7%
Fully worked	17	37.0%	*Obscured*	1	2.2%
Obscured	2	4.3%			
Length of cutting edge in mm (n=45)			Scar Count (n=39)		
Min	7	-	*Min*	9	-
Max	40	-	*Max*	42	-
Mean	20.8	-	*Mean*	19.1	-

Table 5.5.13 Technological observations for handaxes in fresh/slightly abraded condition from Gharmachi 1 (data for1979 and 1981 collections combined).

Scar counts on the Gharmachi 1 handaxes are relatively high, whole handaxes possessing an average of 19.5 scars greater than 5 mm. Given the relatively high levels of refinement apparent in the assemblage, it is likely that this reflects generally intense reduction. All of the Gharmachi 1 handaxes were produced through fully alternate working and all, barring a single trihedral handaxe similar to those encountered in the Latamne "Living floor" assemblages (see section 5.4), possess a single thinned edge. No tranchet removals or evidence of secondary retouch on handaxe edges were observed. For 44.6% of the

Gharmachi 1 handaxes it is possible to recreate the blank type on which the artefact was produced (table 5.5.8). Of these, 72.7% were formed on rounded nodules. The fact that the majority (82.9%) of the 41 handaxes were made on fluvially derived clasts implies that the handaxes in the Gharmachi 1 collections were produced on river cobbles, presumably often originating from the gravels with which the artefacts are associated. Additionally, 26.2% of the complete handaxes studied retain enough cortex to assess the width and thickness of the original nodule, suggesting that these handaxes were produced without the blank being modified much beyond its original form.

Handaxes (moderately/heavily abraded); technological observations (n=19)					
Portion (n=19)			Hammer mode (n=19)		
Whole	15	78.9%	*Hard*	4	21.1%
Tip	0	0.0%	*Soft*	7	36.8%
Butt	0	0.0%	*Mixed*	5	26.3%
Fragment	4	21.1%	*Indeterminate*	3	15.8%
Cortex retention (n=15)			Cortex position (n=15)		
0	4	26.7%	*None*	4	26.7%
>0-25%	5	33.3%	*Butt only*	0	0.0%
>25-50%	5	33.3%	*Butt and edges only*	1	6.7%
>50-75%	0	0.0%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	3	15.2%
Obscured	1	6.7%	*All over*	6	34.8%
			Obscured	1	15.2%
Evidence of blank dimensions? (n=15)					
No	8	53.3%	Edge Position (n=12)		
1 dimension	2	13.3%	*All round*	6	40.0%
2 dimension	4	26.7%	*All edges sharp, dull butt*	2	13.3%
Obscured	1	6.5%	*Most edges sharp, dull butt*	3	20.0%
			One sharp edge, dull butt	1	6.7%
Butt working (n=15)			*Irregular*	1	6.7%
Unworked	4	26.7%	*One sharp edge, sharp butt*	1	6.7%
Partially worked	3	20.0%	*Obscured*	1	6.7%
Fully worked	7	46.7%			
Obscured	1	6.7%			
Length of cutting edge in mm (n=14)			Scar Count (n=11)		
Min	8	-	*Min*	11	-
Max	38	-	*Max*	53	-
Mean	19.7	-	*Mean*	20.8	-

Table 5.5.14 Technological observations for handaxes in moderately/heavily abraded condition from Gharmachi 1 (data for1979 and 1981 collections combined).

In many respects the Gharmachi 1 handaxe assemblage provides a direct contrast to the Latamne "Living floor" collections discussed previously (see section 5.4). The handaxes from Gharmachi 1 tend to be medium-sized and produced on river cobbles. Their shape is generally broad and round, while soft hammer working is frequently observed. Conversely, the Latamne handaxes are often large and worked from fresh tabular nodules. They also tend to be pointed and almost exclusively produced through hard hammer removals. As a result of these differences the Gharmachi 1 assemblage presents higher levels of refinement.

Arguably the differences observed between the Gharmachi 1 and Latamne "Living floor" handaxes can be ascribed to two interlinked factors - the raw material used in their production and the reduction technique employed. Both assemblages possess relatively large numbers of handaxes which retain the form of the original blank, indicating that the raw material used at both sites influenced and directed the choices made by the knapper. However, technological choices independent of material constraints clearly also played a part.

The tabular blocks used at Latamne, when worked using a hard percussor, encouraged the production of pointed forms, since alternate flaking from right-angled edges necessitates the removal of thick flakes biting into the volume of the blank. To begin flaking such blocks arguably demands the use of a hard hammer, with a concomitant effect upon the reductive path subsequently followed. In effect, initial choices direct the actions of the knapper and the choices which are open to them throughout reduction. Therefore, the majority of handaxes from Latamne are pointed and relatively unrefined. In contrast, although the Gharmachi 1 handaxes are similarly "blank-conditioned" (*cf.* White 1996, 1998), they differ from the Latamne sample in several key aspects; notably, the use of a soft hammer, their relative refinement, and broad outline. Arguably, the use of a soft hammer allowed the production of relatively refined forms, with extensive cutting edges, from chert/flint cobbles. A notable proportion of the Gharmachi 1 assemblage retains evidence of the size and shape of the nodules used. Had a hard hammer alone been used, the resulting handaxes might be expected to be smaller, and potentially more pointed; biting scars would have acted to reduce the overall size of artefacts but not their thickness, whilst producing a zig-zag, alternate edge. However, extensive soft hammer flaking allows the handaxe to be thinned without markedly reducing its size in planform. Effectively, a thinned edge is imposed without notably modifying the original *size* of the cobble. It could, therefore, be suggested that the large, flat cobbles available at Gharmachi 1 presented the knapper with a wider variety of options than the "housebricks" of tabular flint available at Latamne.

Flakes

Given that the analysis of the most technologically informative parts of the assemblage clearly demonstrated that no technological differences are apparent between the fresh and fluvially abraded artefact sub-samples from Gharmachi, analysis of the flake assemblage has focussed on elements which have the greatest potential to provide insights into technological practices at the site. Consequently, fluvially re-worked flakes have been excluded from this analysis, and only those in fresh or slightly abraded condition are considered (tables 5.5.15 and 5.5.16). Medium-sized flakes are most commonly encountered amongst this selected sample (see table 5.5.15). Although soft hammer flakes, characteristic of handaxe thinning, are also present (10.8%), the majority were produced through the use of a hard percussor (77.8%). The application of soft hammer handaxe thinning at Gharmachi 1 is also demonstrated by the fact that, although flakes with plain butts are most commonly encountered (38.4%), flakes with soft hammer, marginal and facetted butts (15.1%; combined figure) were also noted.

	Maximum length (mm)	**Maximum breadth (mm)**	**Maximum thickness (mm)**
Mean	46.9	39.7	14.4
Median	44.3	37.2	13.2
Min	18.1	16.4	5.1
Max	108.6	96.6	36.8
St.Dev.	15.3	13.5	5.8

Table 5.5.15 Gharmachi 1 flakes in fresh/slightly abraded condition summary statistics (n=434, fragments excluded - data for 1979 and 1981 collections combined).

Flakes (fresh/ slightly abraded); technological observations (n=555)					
Portion (n=555)			Dorsal scars (n=434)		
Whole	434	78.2%	0	37	8.5%
Proximal	36	6.5%	1	96	22.1%
Distal	52	94%	2	103	23.7%
Mesial	8	1.4%	3	81	18.7%
Siret	25	4.5%	4	53	12.2%
			5	28	6.5%
			>5	29	6.7%
			Obscured	7	1.6%
Dorsal cortex retention (n=434)			Dorsal scar pattern (n=434)		
100%	32	7.4%	*Uni-directional*	197	45.4%
>50%	68	15.7%	*Bi-directional*	12	2.8%
<50%	210	48.4%	*Multi-directional*	184	42.4%
0%	117	27.0%	*Wholly cortical*	34	7.8%
Obscured	7	1.6%	*Obscured*	7	1.6%
Butt type (n=555)			Hammer mode (n=555)		
Plain	213	38.4%	*Hard*	432	77.8%
Dihedral	28	5.0%	*Soft*	60	10.8%
Cortical	52	9.4%	*Indeterminate*	63	11.4%
Natural (but non-cortical)	19	3.4%			
Marginal	57	10.3%	Relict core edge(s) (n=434)		
Mixed	10	1.8%	*Yes*	90	20.7%
Soft hammer	25	4.5%	*No*	334	79.3%
Facetted	2	0.4%			
Obscured	89	16.0%			
Missing	60	10.8%			

Table 5.5.16 Technological observations for flakes in fresh/slightly abraded condition from Gharmachi 1 (data for 1979 and 1981 collections combined).

Generally, dorsal scar counts on the Gharmachi 1 flakes tend to be low; with only 25.4% possessing more than three scars over 5 mm in maximum length. However, if flakes produced using a soft and a hard percussor are considered separately, the percentage with more than three scars rises to 55.8% for the soft hammer flakes, but declines to 20.4% for the hard hammer flakes (data not presented). As the handaxes from Gharmachi 1 have been demonstrated to possess high scar counts and levels of refinement, this data indicates that the soft hammer flakes are associated with the thinning of handaxes at the site. Conversely, the low scar counts on hard hammer flakes suggest that they are a product of the early stages of handaxe production and/or core working, which does not appear to have been that intensive or prolonged. The association between the soft hammer flakes with the thinning of handaxes is further supported by the fact that they possess higher levels of multi-directional scar patterns relative to hard hammer flakes (soft hammer = 67.4%, hard hammer = 37.9%), which is indicative of detachment towards the end of a relatively prolonged reduction sequence.

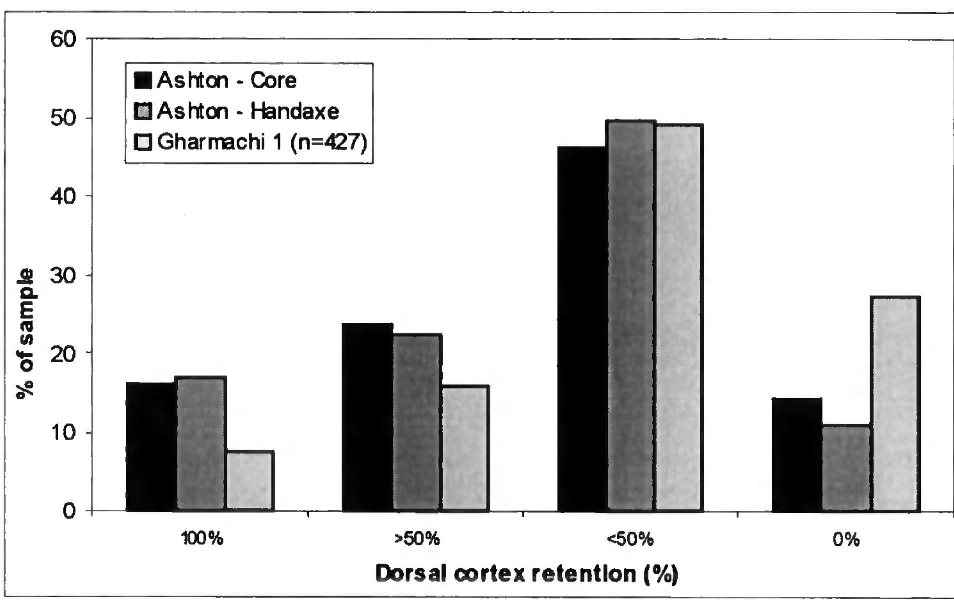

Figure 5.5.7 Comparison of percentage dorsal cortex retention on flakes from Gharmachi 1 excavations (data for 1979 and 1981 collections combined), and experimental data generated by Ashton (1998b) for core and handaxe reduction.

In order to assess whether the fresh and slightly abraded flakes found at Gharmachi relate to complete reduction sequences the proportions of the amount of cortex they retain has been compared with Ashton's (1998b) experimental data for cortex retention on flakes produced during experimental core and handaxe reduction (figure 5.5.7). For the most part, the Gharmachi 1 data follows the general pattern produced during experimental working, with the notable exceptions being flakes without cortex, which are over-represented, whilst to a lesser extent, cortical flakes are under-represented. This pattern may be the result of hominins bringing roughly decorticated nodules into the site, or the reworking of finished handaxes.

Retouched Tools

Twelve retouched flakes were identified amongst the selected artefacts from Gharmachi 1. The nature and position of the retouch on these artefacts is presented in table 5.5.17. No obvious pattern is apparent, the flakes being seemingly retouched in a fairly *ad hoc* manner.

Nature of retouch on modified flakes (n=12)			
Position		Location	
Direct	8	*Distal*	3
Inverse	3	*One lateral edge*	5
Bifacial	1	*Continuous, except butt*	2
		Continuous, except distal/tip	2
Distribution		Edge form	
Continuous	6	*Convex*	5
Discontinuous	1	*Concave*	1
Isolated removal	5	*Nosed*	1
		Flaked flake	5
Extent of retouch		Angle of retouched edge	
Minimally invasive	2	*Abrupt*	3
Semi-Invasive	3	*Semi abrupt*	7
Invasive	7	*Low*	2
Regularity of retouched edge		Morphology of retouch	
Regular	5	*Scaly*	4
Irregular	2	*Sub-parallel*	3
Single removal	5	*Single removal*	5

Table 5.5.17 Nature of retouch on modified flakes from Gharmachi 1 (data for 1979 and 1981 collections combined).

Technology and Hominin Behaviour

The selected artefacts studied from Gharmachi 1 comprise an assemblage which has undergone fluvial rearrangement since deposition by hominins together with material which is minimally disturbed, and, as such, represents a primary context - if not *in situ* – collection. Although this relatively undisturbed accumulation is undated, it is unlikely to markedly post-date the aggradation of the gravels. This may suggest that the fresh material from the site is reflective of hominin activity on the edge of the paleo-Orontes, in a similar situation to that apparent at the Latamne "Living floor" site (see section 5.4). The fact that the gravels at Gharmachi are thought to have accumulated during MIS 12/11, may possibly indicate that the primary context artefact accumulations at the two sites date to the same broad time period.

In addition, the technological patterns that can be inferred from examination of the Gharmachi 1 artefacts are similar to those observed at the Latamne "Living floor" site, albeit at a lower scale of archaeological resolution. However, key specific differences are also apparent. As at Latamne, there is some evidence that the Gharmachi 1 artefacts represent partial knapping sequences, with an emphasis on the latter end of reduction, potentially indicating the transportation of decorticated nodules into the site, or the finishing of handaxes. Although the possible distances involved in this separation of the *chaîne opératoire* are uncertain, they need not have been significant. Core working at Gharmachi 1 appears to have followed a similar reduction strategy to that observed at Latamne, being characterised by simple alternate knapping sequences seemingly geared towards the production of medium-sized flakes. However, it is noticeable that at Gharmachi more episodes of flaking were undertaken, but in shorter sequences. This observation may relate to the comparative lack of tabular blanks at Gharmachi, which arguably favour relatively extended alternate knapping sequences along their edges. The few flake tools identified amongst the Gharmachi 1 assemblage, like those from Latamne, seem to have been produced on an *ad hoc* basis.

In many ways the Gharmachi 1 handaxes provide a direct contrast to those from the Latamne "Living floor" site. While the Latamne handaxes are predominantly large, unrefined and pointed, those from Gharmachi 1 tend to be medium-sized, relatively refined and round in planform. These differences seem to relate to the fact that the Latamne handaxes were largely produced on tabular nodules and worked using a hard hammer, while the Gharmachi 1 examples were fashioned from river cobbles, frequently using a soft hammer. This underlines the fact that whilst undertaking similar technological actions, the finished forms of Middle Pleistocene artefacts, in particular handaxes, are mediated by specific circumstances and do not necessarily have chronological or cultural meaning.

5.6 Jrabiyat 2, 3 and 4

Location & History of Investigation

During the 1977 CNRS survey of the Pleistocene geology and Palaeolithic archaeology of the Orontes (see chapter four, section 4.2), significant concentrations of Palaeolithic artefacts were recovered from fluvial deposits located around the village of Jrabiyat (Copeland and Hours 1993, 93).

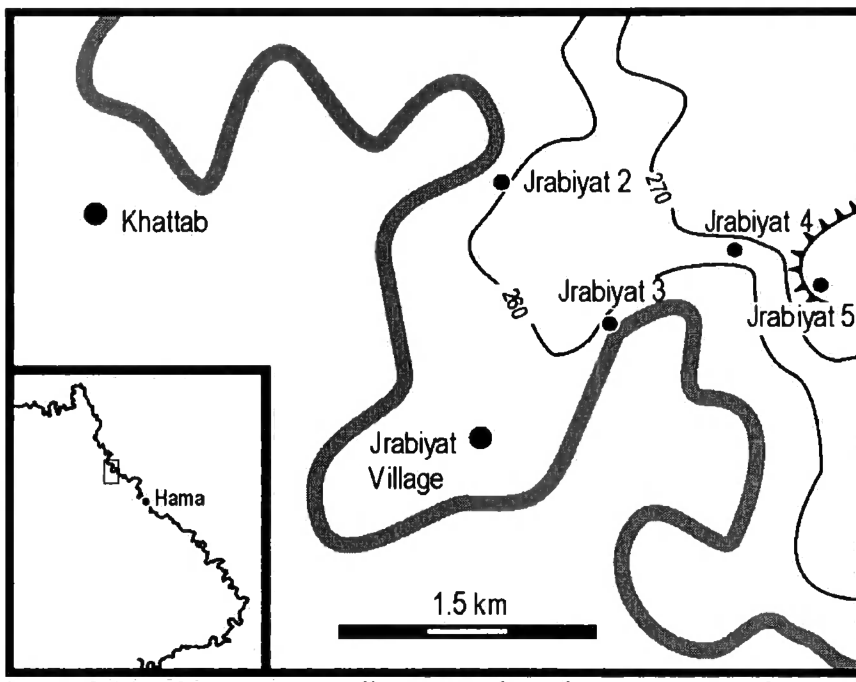

Figure 5.6.1 Location map illustrating the relative position of Lower Palaeolithic sites situated in the vicinity of Jrabiyat village.

Jrabiyat is located ~9 km downstream from Hama on the east bank of the Orontes and sits on the tip of a tongue of land protruding into a large meander of the river (see figures 5.6.1). The 1977 fieldwork identified four separate terrace formations in the area around the village (Sanlaville and Besançon 1993, 26). In ascending order, these were a Holocene flood plain terrace, a Qf I terrace, a Qf II terrace and a Qf III terrace (see chapter four, section 4.3 for an explanation of terrace nomenclature). Artefacts were recovered from exposures of each of the Pleistocene terrace formations; however, only those found in deposits thought to have aggraded during MIS 8 or earlier are considered here. In total, four artefact-bearing locales ascribed to this period were identified; Jrabiyat 2 Jrabiyat 3, Jrabiyat 4 and Jrabiyat 5 (see figure 5.6.1).

Jrabiyat 2 is the first of three artefact findspots associated with the Qf II formation. It is located north of Jrabiyat village overlooking a meander loop cut into the Holocene terrace. A total of 80 artefacts were recovered from the fluvial deposits at this site (Copeland and Hours 1993, 93). Jrabiyat 3 also produced artefacts from a Qf II exposure and is located ~1 km north-east of the village. Here, 127 artefacts were recovered from a section exposed in a road cutting (Copeland and Hours 1993, 93). Jrabiyat 4 is the final Qf II exposure from which artefacts were recovered. It produced 149 artefacts from a quarry section located ~2 km north-east of Jrabiyat village (Copeland and Hours 1993, 93). Jrabiyat 5 is a Qf III gravel exposure located ~2 km north east of the village. This locale produced 25 artefacts (Copeland and Hours 1993, 74).

Further Palaeolithic artefact discoveries were made in the Jrabiyat area during fieldwork carried out in 1988 by Paul Sanlaville, Jacques Besançon and Sultan Muhesen (Muhesen 1993). A total of 253 artefacts, including over 100 handaxes, were recovered from a field surface covering an area of ~200 m by ~40 m (Muhesen 1993, 151). The findspot, referred to as Jrabiyat 6/88, is in close proximity to Jrabiyat 3. However, these artefacts were recovered from a field surface and are therefore undated. Consequently, they have not been considered in this study.

Geological Background & Preferred Dating

The fluvial deposits found at Jrabiyat 2, 3, 4 and 5 are regarded as belonging to two separate terrace aggradations which have been differentiated from one another because they are located at different altitudes, and because distinct terrace flats were recognised (Sanlaville and Besançon 1993, 27). In the area surrounding Jrabiyat village, the Orontes is situated ~250 m above sea level (Besançon and Sanlaville 1993, figure 7). The Jrabiyat 5 fluvial deposits are located ~40 m above the present river level (Besançon and Sanlaville 1993, 26, figure 7) and, on the basis of altitude, have been suggested to be broadly contemporary with the Latamne formation and the fluvial deposits at Gharmachi 1 which are at a similar height (Besançon and Sanlaville 1993, 27). This suggests a possible date of MIS 12/11 for the emplacement of the Jrabiyat 5 gravels (see above).

The gravels at Jrabiyat 2, 3 and 4 are found at points located between ~7 m and ~20 m above the modern river and have been ascribed to the Qf II formation of the Orontes (Besançon and Sanlaville 1993, 27). They consist of coarse-grained fluvial material interspersed with lenses of sand, emplaced on chalk/marl bedrock (Besançon and Sanlaville 1993, 27). In their most recent publications, members of the CNRS survey suggest that these deposits, and all other Qf II deposits in their survey area, were emplaced during MIS 8 (Besançon and Geyer 2003, 123, Sanlaville 2004, 56). However, as this age estimate is based solely on comparison between the altitude of these deposits and those at Latamne, it should be regarded as tentative.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Jrabiyat 2		Jrabiyat 3		Jrabiyat 4	
	No. of artefacts	**% of total**	**No. of artefacts**	**% of total**	**No. of artefacts**	**% of total**
Non-Levallois cores	21	37.5%	20	28.6%	33	26.4%
Simple prepared cores	1	1.8%	0	0.0%	0	0.0%
Handaxes	14	25.0%	10	14.3%	20	16.0%
Flakes	20	35.7%	40	57.1%	72	57.6%
Flake tools	0	0.0%	0	0.0%	0	0.0%
Total	56	100%	70	100%	125	100.0%

Table 5.6.1 Material analysed from Jrabiyat 2, 3 and 4.

Investigation of the archaeological material from the area surrounding Jrabiyat village has exclusively focussed on the artefacts recovered from the Jrabiyat 2, 3 and 4 sites (see table 5.6.1). The Jrabiyat 5 material has been excluded due to the small size of the collection. All the artefacts studied are located in the National Museum, Damascus.

Taphonomy of lithic assemblage

Cores from Jrabiyat 2, 3 and 4 (n=74)					
Unabraded	8	10.8%	*No edge damage*	1	1.4%
Slightly abraded	12	16.2%	*Slight edge damage*	10	13.5%
Moderately abraded	21	28.4%	*Moderate edge damage*	31	41.9%
Heavily abraded	33	44.6%	*Heavy edge damage*	32	43.2%
Unstained	4	5.4%	*Unpatinated*	0	0.0%
Lightly stained	9	12.2%	*Lightly patinated*	8	10.8%
Moderately stained	8	10.8%	*Moderately patinated*	60	81.1%
Heavily stained	53	71.6%	*Heavily patinated*	6	8.1%
No battering	37	50.0%	*Unscratched*	65	87.8%
Light battering	9	12.2%	*Lightly scratched*	8	10.8%
Moderate battering	26	35.1%	*Moderately scratched*	1	1.4%
Heavy battering	2	2.7%	*Heavily scratched*	0	0.0%

Table 5.6.2 Condition of cores from Jrabiyat 2, 3 and 4.

Although the Jrabiyat 2, 3 and 4 artefacts were recovered from three sections cut into a single fluvial formation, and are therefore regarded as broadly contemporary, the three artefact collections were originally considered separately to assess any variation in their depositional history. However, as the same broad patterns were apparent in each assemblage, they are presented here as a single dataset (tables 5.6.2, 5.6.3 and 5.6.4). Most artefacts display evidence of at least moderate fluvial abrasion (78.4%; all artefacts combined), and only a small fraction are unabraded (6.4%; all artefacts combined). This would indicate that the vast majority of the Jrabiyat 2, 3 and 4 artefacts have been subject to extensive fluvial displacement. Consequently, the three collections have been analysed as a single assemblage from a broad landscape catchment that is tentatively regarded as having accumulated at any point, or points, during MIS 8 and may have been produced before this.

Handaxes from Jrabiyat 2, 3 and 4 (n=44)					
Unabraded	2	4.5%	*No edge damage*	0	0.0%
Slightly abraded	3	6.8%	*Slight edge damage*	4	9.1%
Moderately abraded	11	25.0%	*Moderate edge damage*	15	34.1%
Heavily abraded	28	63.6%	*Heavy edge damage*	25	56.8%
Unstained	2	4.5%	*Unpatinated*	9	20.5%
Lightly stained	3	6.8%	*Lightly patinated*	13	29.5%
Moderately stained	3	6.8%	*Moderately patinated*	22	50.0%
Heavily stained	36	81.8%	*Heavily patinated*	0	0.0%
No battering	16	36.4%	*Unscratched*	43	97.7%
Light battering	12	27.3%	*Lightly scratched*	1	2.3%
Moderate battering	7	15.9%	*Moderately scratched*	0	0.0%
Heavy battering	9	20.5%	*Heavily scratched*	0	0.0%

Table 5.6.3 Condition of handaxes from Jrabiyat 2, 3 and 4.

Flakes from Jrabiyat 2, 3 and 4 (n=132)					
Unabraded	6	4.5%	*No edge damage*	1	0.8%
Slightly abraded	23	17.4%	*Slight edge damage*	4	3.0%
Moderately abraded	57	43.2%	*Moderate edge damage*	55	41.7%
Heavily abraded	46	34.8%	*Heavy edge damage*	72	54.5%
Unstained	2	1.5%	*Unpatinated*	3	2.3%
Lightly stained	7	5.3%	*Lightly patinated*	24	18.2%
Moderately stained	14	10.6%	*Moderately patinated*	100	75.8%
Heavily stained	109	82.6%	*Heavily patinated*	5	3.8%
No battering	82	62.1%	*Unscratched*	103	78.0%
Light battering	23	17.4%	*Lightly scratched*	23	17.4%
Moderate battering	26	19.7%	*Moderately scratched*	5	3.8%
Heavy battering	1	0.8%	*Heavily scratched*	1	0.8%

Table 5.6.4 Condition of flakes from Jrabiyat 2, 3 and 4.

Technology of lithic assemblage

Raw Material

The vast majority of artefacts analysed from Jrabiyat 2, 3 and 4 were produced on coarse-grained chert/flint blanks. However, a single quartzite flake was identified in the collection from Jrabiyat 4. Since much of the material from the sites has been fluvially modified, it is only possible to assess the nature of the raw material source used for 16.3% of the chert/flint artefacts considered (see table 5.6.5). From this limited data it can be concluded that chert/flint from both primary and secondary contexts was employed to produce artefacts found in the combined assemblage from Jrabiyat 2, 3 and 4. Rounded nodules were most frequently exploited (42.4%) in the reduction of the cores and handaxes studied, although tabular and shattered nodules were also used.

	Cores (n=75)	Handaxes (n=44)	Flakes (n=132)
Raw material			
Fresh	4.0%	6.8%	3.8%
Derived	17.3%	4.5%	7.6%
Indeterminate	78.7%	88.6%	88.6%
Blank form			
Nodule (Rounded)	48.0%	31.8%	-
Nodule (Tabular)	4.0%	15.9%	
Shattered Nodule	17.3%	9.1%	-
Flake	0.0%	0.0%	-
Thermal flake	0.0%	0.0%	-
Indeterminate	30.7%	43.2%	-

Table 5.6.5 Raw material and inferred blank form for artefacts studied from Jrabiyat 2, 3 and 4.

Core Working

	Maximum dimensions (mm)	Weight (grams)
Mean	87.8	356.5
Median	87.4	265
Min	47	47
Max	153	1127
St.Dev.	27.8	287.3

Table 5.6.6 Jrabiyat 2, 3 and 4 cores summary statistics (n=72, fragments excluded).

The cores from Jrabiyat 2, 3 and 4 tend to be relatively large with an average maximum dimension of 87.8 mm and an average weight of 356.5 grams (table 5.6.6). As the majority of the cores display evidence of fluvial transport, this observation probably reflects the fact that the cores were recovered from coarse fluvial gravels. However, it is also possible that larger cores were easier to find and collect, and so they are over-represented in the sample.

The technological attributes of cores from the three Jrabiyat locales are summarized in table 5.6.7. The sample is dominated by migrating platform cores (80.0%) characterised by the exploitation of platforms on an *ad hoc* basis as they present themselves throughout the reduction. In addition ten cores worked from a single unprepared platform, one discoidal core, and one simple prepared core were also identified. Although the presence of the latter is notable as it possesses all the features of Boëda's (1986, 1995) volumetric definition of the Levallois method, save for lack of evidence for deliberate configuration (see chapter three), its significance should not be overstated, as single fortuitous examples of such cores are found in many assemblages datable to the Middle Pleistocene (White and Ashton 2003).

Cores; technological observations (n=75)					
Overall core reduction (n=75)			Core episodes (n=169)		
Migrating platform	60	80.0%	*Type A: Single Removal*	27	16.0%
Single platform unprepared	10	13.3%	*Type B: Parallel flaking*	43	25.4%
Discoidal	1	1.3%	*Type C: Alternate flaking*	69	40.8%
Simple Prepared	1	1.3%	*Type D: Unattributed removal*	30	17.8%
Fragment	3	4.0%			
Flake scars/core (n=71)			Core episodes/core		
1-5	29	40.8%	*Min*	1	-
6-10	27	38.0%	*Max*	6	-
11-15	13	18.3%	*Mean*	2.3	-
>15	2	2.8%			
Max	24	-	Flake scars/core episode		
Mean	8.5	-	*Min*	1	-
			Max	17	-
% Cortex (n=71)			*Mean*	3.1	-
0	1	1.4%			
>0-25%	13	18.3%	Blank form retained? (n=71)		
>25-50%	21	29.6%	*Yes*	50	70.4%
>50-75%	29	40.8%	*No*	21	29.6%
>75%	7	9.9%			

Table 5.6.7 Technological observations for cores from Jrabiyat 2, 3 and 4.

Flaking of the Jrabiyat cores is characterised by a restricted number of episodes (average = 2.3) of alternate flaking (40.8%), each of which involved a limited number of removals (average = 3.1). Reduction does not seem to have been prolonged as only 2.8% of cores possess more than 15 scars, while the majority (78.9%) retain ten or less. The impression that the Jrabiyat cores tended to be discarded after a few, short episodes of flaking is reinforced by the high levels of cortex rentention recorded, with 50.7% of cores possessing cortex on over 50% of their surface area. As such, working of the Jrabiyat 2, 3 and 4 cores, like those from the Latamne "Living floor" site (see section 5.4) and Gharmachi 1 (see section 5.5), seems to have been geared towards the production of large and medium-sized flakes, flaking not being continued once smaller flakes began to be produced.

Handaxes

	Length (mm)	Breadth (mm)	Thickness (mm)
Mean	108.4	74.7	38.6
Median	104	77	39
Min	69	43	18
Max	167	105	61
St.Dev.	24.4	15.2	10.9

Table 5.6.8 Jrabiyat 2, 3 and 4 handaxe summary statistics (n=39, fragments excluded).

The handaxes from Jrabiyat 2, 3 and 4 tend to be medium-sized (see table 5.6.8). In terms of planform, the collection contains pointed and ovate forms in near equal proportions (see figure 5.6.2). However, the pointed examples tend towards the broader and less elongated end of the spectrum of variation recognised for such handaxes, while the ovates frequently have pointed tips. This pattern mirrors that recorded for the Gharmachi 1 handaxe assemblage (see section 5.5) and, as with the Gharmachi 1 handaxes, the planform of the Jrabiyat 2, 3 and 4 sample can be seen to represent a continuum of variability for an assemblage dominated by broad, squat handaxes whose tips frequently taper towards a point.

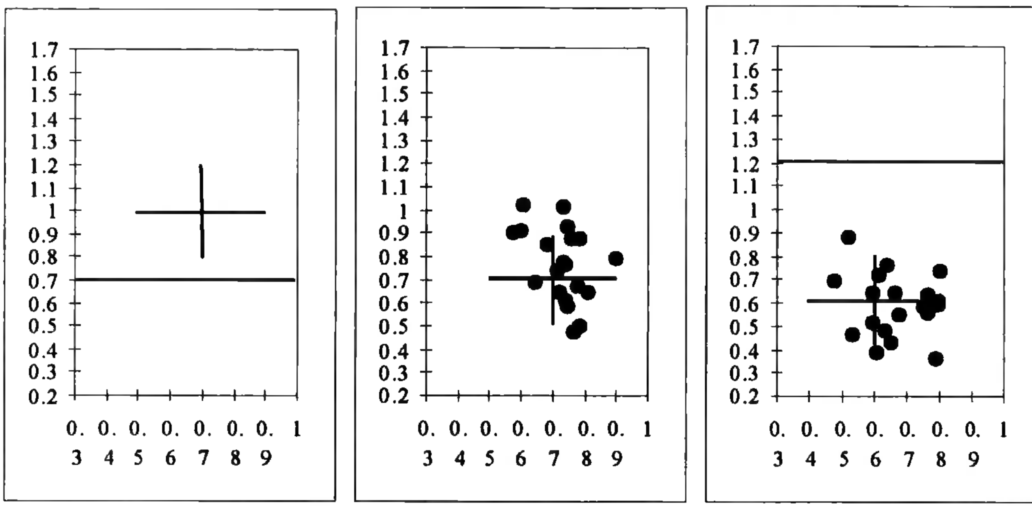

Figure 5.6.2 Tripartite diagrams for whole handaxes studied from Jrabiyat 2, 3 and 4 (n=39).

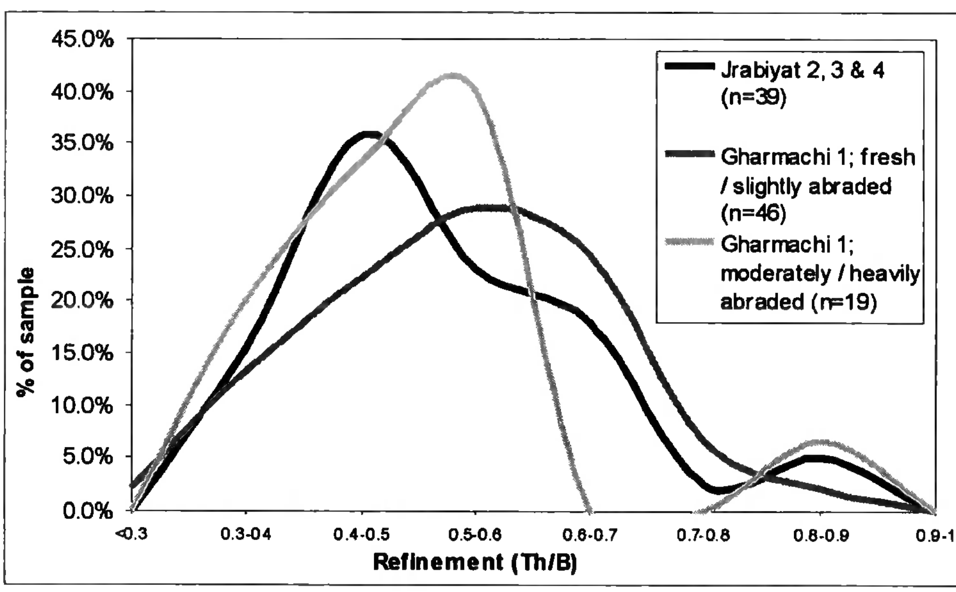

Figure 5.6.3 Levels of refinement for all whole handaxes studied from Jrabiyat 2, 3 and 4, and Gharmachi 1 (data for 1979 and 1981 collections combined).

For the majority (63.6%) of the Jrabiyat handaxes it is impossible to directly determine the type of percussor used (table 5.6.9) as most have suffered from fluvial abrasion. From the limited data available it is apparent that hard, soft and mixed hammer modes were all employed. It could be suggested that because the handaxes show generally high levels of refinement (see figure 5.6.3), soft hammer thinning was frequently employed at some stage during the reduction sequence, particularly as they display similar levels of refinement to the Gharmachi 1 handaxes (which are generally thinned with a soft hammer). However, as the Gharmachi 1 data suggests that fluvial rolling can increase the levels of refinement exhibited by handaxes (see figure 5.6.3 and section 5.5), such evidence cannot be regarded as conclusive.

Handaxes; technological observations (n=44)					
Portion (n=44)			Hammer mode (n=44)		
Whole	39	88.6%	*Hard*	11	25.0%
Tip	2	4.5%	*Soft*	4	9.1%
Butt	3	6.8%	*Mixed*	1	2.3%
Fragment	0	0.0%	*Indeterminate*	28	63.6%
Cortex retention (n=39)			Cortex position (n=39)		
0	6	15.4%	*None*	7	17.9%
>0-25%	12	30.8%	*Butt only*	8	20.5%
>25-50%	13	33.3%	*Butt and edges*	0	0.0%
>50-75%	5	12.8%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	6	15.4%
Obscured	3	7.7%	*All over*	15	38.5%
			Obscured	3	7.7%
Evidence of blank dimensions? (n=39)			Edge Position (n=39)		
No	13	33.3%	*All round*	12	30.8%
1 dimension	10	25.6%	*All edges sharp, dull butt*	8	20.5%
2 dimension	13	33.3%	*Most edges sharp, dull butt*	4	10.3%
Obscured	3	7.7%	*One sharp edge, dull butt*	5	12.8%
			Irregular	1	2.6%
Butt working (n=39)			*Most edges sharp, sharp butt*	2	5.1%
Unworked	6	15.4%	*One sharp edge, sharp butt*	1	2.6%
Partially worked	21	53.8%	*Tip only*	3	7.7%
Fully worked	9	23.1%	*Obscured*	3	7.7%
Obscured	3	7.7%			
Length of cutting edge in mm (n=39)			Scar Count (n=36)		
Min	8	-	*Min*	5	-
Max	39	-	*Max*	43	-
Mean	19.7	-	*Mean*	18.5	-

Table 5.6.9 Technological observations for handaxes from Jrabiyat 2, 3 and 4.

Scar counts on the handaxes from Jrabiyat are generally high (average of 18.5 scars >5 mm), suggesting intensive blank reduction. Despite this, most of the handaxes retain some cortex on their surface (76.9%), while almost half (46.1%) possess cortex on more than 25% of their total surface area. It is most commonly located in patches all over the artefact (38.5%). This suggests that, like the Gharmachi 1 handaxes, those from Jrabiyat were thinned without markedly reducing the size of the original blank. Arguably, this could only be achieved using a soft hammer.

As with the Gharmachi handaxes, nearly a third (30.8%) of the handaxes from Jrabiyat 2, 3 and 4 possess a cutting edge around their entire circumference. Additionally, the majority of the Jrabiyat handaxes possess a partially worked butt (76.9%), while 23.1% possess a fully worked butt. All of the handaxes from Jrabiyat 2, 3 and 4 were produced through fully alternate working and all, barring a single trihedral handaxe, possess a single thinned edge. While the majority of the handaxes possess straight or zig-zag edge profiles (data not presented), a single twisted ovate from Jrabiyat 2 was encountered. No tranchet removals were observed. For 56.8% of the handaxes from Jrabiyat 2, 3 and 4 it is possible to recreate the blank on which the artefact was produced (see table 5.6.5). The majority of these (56.0%) were fashioned on rounded nodules. Additionally, 33.3% of the handaxes studied retain sufficient cortex to assess the form of the original blank in two dimensions, and therefore for these handaxes it can be postulated that the volume does not differ greatly from that of the original blank exploited. Unfortunately, due to the generally abraded nature of the assemblage, there is not sufficient data to assess whether chert/flint from a primary or derived source was preferentially employed in the production of the handaxes from Jrabiyat 2, 3 and 4 (see table 5.6.5).

In terms of final form, the Jrabiyat 2, 3 and 4 handaxes closely resemble those from Gharmachi 1. Both assemblages display similar levels of refinement, cortex retention, cortex position, blank type, blank size and degree of blank conditioning. In addition, it seems likely that soft hammer thinning played a significant part in the production of many of the handaxes in both assemblages. Consequently, the handaxes from both locations can be characterised as broad and squat in planform, relatively refined, produced on medium-sized rounded nodules and frequently thinned using a soft hammer. This suggests that the similarity in the finished form of the handaxes from Jrabiyat and Gharmachi can be directly attributed to the exploitation of common blank type through broadly similar technological actions.

Flakes

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	61.4	53.7	20.3
Median	57.4	51.2	19.0
Min	21.0	20.0	8.0
Max	110.3	113.0	42.2
St.Dev.	18.1	20.4	7.6

Table 5.6.10 Jrabiyat 2, 3 and 4 flake summary statistics (n=112, fragments excluded).

The flakes from Jrabiyat 2, 3 and 4 are relatively large and thick (see table 5.6.10). This reflects the fact that they generally display significant evidence of fluvial abrasion (see table

5.6.4), which tends to fragment smaller, thinner examples. In addition, large flakes are perhaps more likely than small ones to be collected from sections.

Flakes; technological observations (n=132)					
Portion (n=132)			Dorsal scars (n=112)		
Whole	112	84.8%	0	21	18.8%
Proximal	8	6.1%	1	27	24.1%
Distal	10	7.6%	2	18	16.1%
Mesial	0	0.0%	3	21	18.8%
Siret	2	1.5%	4	16	14.3%
			5	38	2.7%
			>5	36	1.8%
			Obscured	24	4.6%
Dorsal cortex retention (n=112)			Dorsal scar pattern (n=112)		
100%	20	17.9%	*Uni-directional*	27	24.1%
>50%	28	25.0%	*Bi-directional*	4	3.6%
<50%	42	37.5%	*Multi-directional*	56	50.0%
0%	17	15.2%	*Wholly cortical*	20	17.9%
Obscured	4	3.6%	*Janus flake*	1	0.9%
Janus flake	1	0.9%	*Obscured*	4	3.6%
Butt type (n=132)			Hammer mode (n=132)		
Plain	55	41.7%	*Hard*	120	90.9%
Dihedral	1	0.8%	*Soft*	2	1.5%
Cortical	19	14.4%	*Indeterminate*	10	7.6%
Natural (but non-cortical)	5	3.8%			
Marginal	3	2.3%	Relict core edge(s) (n=112)		
Mixed	6	4.5%	*Yes*	13	11.6%
Soft hammer	2	1.5%	*No*	95	84.8%
Facetted	0	0.0%	*Obscured*	4	3.6%
Obscured	31	23.5%			
Missing	10	7.6%			

Table 5.6.11 Technological observations for flakes from Jrabiyat 2, 3 and 4.

Hard hammer flakes dominate the assemblage (90.9%; table 5.6.11), a pattern which could in part be affected by taphonomic factors. Soft hammer flakes tend to possess thinner profiles than hard hammer flakes and, as such, are likely to be under-represented in fluvially re-worked grab samples such as those from the Jrabiyat locales. Additionally, the observations that the flakes in the assemblages tend to possess high levels of cortex retention (42.9% possess cortex on >50% of their dorsal surface) and low scar counts (92.1% possess four scars or less), is probably reflective of the more robust nature of flakes that retain cortex and which are from earlier in the reduction sequence, opposed to non-cortical flakes from later phases of knapping.

Despite the probable under-representation of soft hammer flakes in the collections, their presence in small numbers (1.5%), along with flakes that possess marginal and soft hammer butts, indicative of soft hammer thinning (3.8%), adds to the impression gained from the handaxes that soft hammer working was practiced within the landscape catchment associated with the Jrabiyat 2, 3 and 4 fluvial deposits. Unfortunately, the taphonomic history and context of the flakes from Jrabiyat locales, precludes any further inferences regarding technological decision making.

Retouched Tools

No retouched artefacts were identified in the Jrabiyat 2, 3 and 4 lithic collections.

Technology and Hominin Behaviour

The vast majority of the artefacts from Jrabiyat 2, 3 and 4 have been subject to extensive fluvial displacement and represent material which has been accumulated from a broad landscape catchment, potential at some point (or points) during MIS 8. As such, the artefacts reflect hominin practices on a broad scale within such a catchment, and cannot be related to ethnographic-scale questions concerning specific technological actions. However, a number of significant observations can be made.

The majority of cores from Jrabiyat 2, 3 and 4 have been subject to a similar reduction strategy as those from the Latamne "Living floor" site and Gharmachi 1. Like the cores from those locales, the examples from Jrabiyat tend to have been worked through the *ad hoc* flaking of nodules, seemingly with the intention of producing medium-sized products. Once flakes of such size could no longer be produced, the majority of the Jrabiyat cores were abandoned; this includes a single, simple prepared core. The handaxes closely resemble those from Gharmachi 1, in that they tend to be broad and squat in planform, relatively refined, produced on medium-sized rounded nodules and frequently thinned using a soft hammer. This is interesting as it suggests that the similarity in the finished forms of the handaxes from Jrabiyat and Gharmachi can be directly attributed to the exploitation of common blank types through analogous technological actions.

5.7 Summary of the Lower Palaeolithic Occupation in the Orontes Valley

The Lower Palaeolithic sites of the Orontes Valley presented here form an important corpus and allow, for the first time, reconstruction of hominin practices within this regional context. The sites considered differ in degree of preservation, ranging from pristine, spatially delimited snapshots of hominin activity at a particular place (e.g. Latamne "Living floor") to re-worked samples of artefacts produced over an extended period of time and throughout an entire river catchment (e.g. Jrabiyat findspots). This very variability is, in fact, an interpretative asset; appreciating the difference between different samples and the manner in which they were accumulated allows a contextualised understanding of technological actions and patterns ranging from individual technological choices, to limiting factors and how these impacted upon hominin behaviours.

Through contextualising technological analysis in this way, it has become apparent that Lower Palaeolithic assemblages from the Orontes Valley cannot easily be classified in terms of chronologically bounded or culturally significant artefact types. Rather, all the sites considered here reflect a common technological approach, although the specific actions undertaken vary in response to particular local circumstances. All share a common repertoire of simple core working and flake production, although reduction intensity can be seen to vary to some degree between assemblages. Such variability cannot, however, be attributed to technological evolution, but rather to specific local conditions; thus cores from Gharmachi 1 appear less intensively worked than those from Latamne, since the river pebbles selected for working in this way did not permit the same prolonged sequences of alternate flaking as was possible using the tabular blanks selected at Latamne. In a similar way, the fact that cores from Rastan are so summarily worked is not related to the limited technological repertoire of the Rastan knappers, but to the very restricted size of the pebbles available there.

It is clear that a contextualised appreciation of technological variability is especially important to understanding variability in the form of handaxes from Lower Palaeolithic sites in the Orontes Valley. Indeed, it is also key to appreciating why in certain contexts handaxes were not produced at all. For instance, the restricted size of the nodules available at Rastan arguably made handaxe production impossible. The lack of handaxes at the site therefore relates to local raw material constraints, rather than being a function of a particular technological repertoire. Variability in handaxe form can similarly be appreciated in terms of hominin response to local affordances. The thinned, rounded handaxes from Gharmachi have previously been viewed as younger, and more technologically advanced, than the thick pointed forms from Latamne; here it is argued that not only are both sites of similar date, but that the differences in form actually relate to available raw material and the technological choices made by the knapper. The tabular blocks used at Latamne demanded an approach to reduction which resulted in pointed forms, since it was necessary to bite into the volume of the "brick-shaped" clasts to impose a cutting edge. Flaking of a volume in this way had the concomitant effect of precluding the extensive use of a soft hammer to thin the piece. This contrasts with Gharmachi, where handaxes were fashioned from rounded river cobbles, frequently using a soft hammer.

Whilst sites like Gharmachi and Latamne allow the situations in which such choices were made to be investigated, sites which are the result of the ongoing accumulation of material from throughout a regional catchment emphasise the scale upon which limiting parameters such as raw material constraints operated. The approach taken here to understanding technological actions allows a consideration of different contexts as different Lower Palaeolithic places. Landscape samples, such as those from the gravels at Jrabiyat, and the abraded components of the Rastan and Gharmachi assemblages, reflect repeated action within a given regional catchment, and emphasise the fact that even over protracted periods of time, local affordances exerted a strong and continuous influence upon the choices available to Lower Palaeolithic people.

Sites like Latamne and Gharmachi are specific places with particular resources, at which a limited set of actions were undertaken. Analysis of the assemblages from these sites again suggests the very local character of Lower Palaeolithic behaviour in the Orontes Valley; the contexts themselves are places at which particular opportunities occurred together – namely, raw material, fresh water, and potentially prey species attracted to the water source. Artefacts (especially handaxes) appear to have been made and discarded within these places, but there is no clear evidence that they were imported and discarded over any great distance. However, it is also apparent that not all technological actions were undertaken within these places; the *chaîne opératoire* was disaggregated to some degree. In particular, at both Latamne and Gharmachi nodule selection and decortication seem to have been undertaken outside the excavated area. Taken together, these detailed pictures of hominin actions at particular places, together with the broader impression of their response to wider local limiting conditions provided by samples from gravels, allow hominin technological behaviour and landscape-use to be appreciated in terms of response to the distribution and nature of available resources, not simply as the static residues of chronologically delimited cultural groups.

Chapter 6
The Earlier Palaeolithic of the Orontes Valley – Middle Palaeolithic Sites

6.1 Introduction

The assemblages considered in this chapter consist of "Middle Palaeolithic" collections from the Orontes Valley. As they are either surface finds, or are from contexts for which only tentative age ranges can be assigned, this definition is based on the typo-technological characteristics of the assemblages, following the criteria outlined previously in chapter three. All are from the same broad geographic region in the Orontes Valley as the Lower Palaeolithic sites considered in chapter five; the stretch of the river between Rastan and Aacharne (see figure 6.1.1).

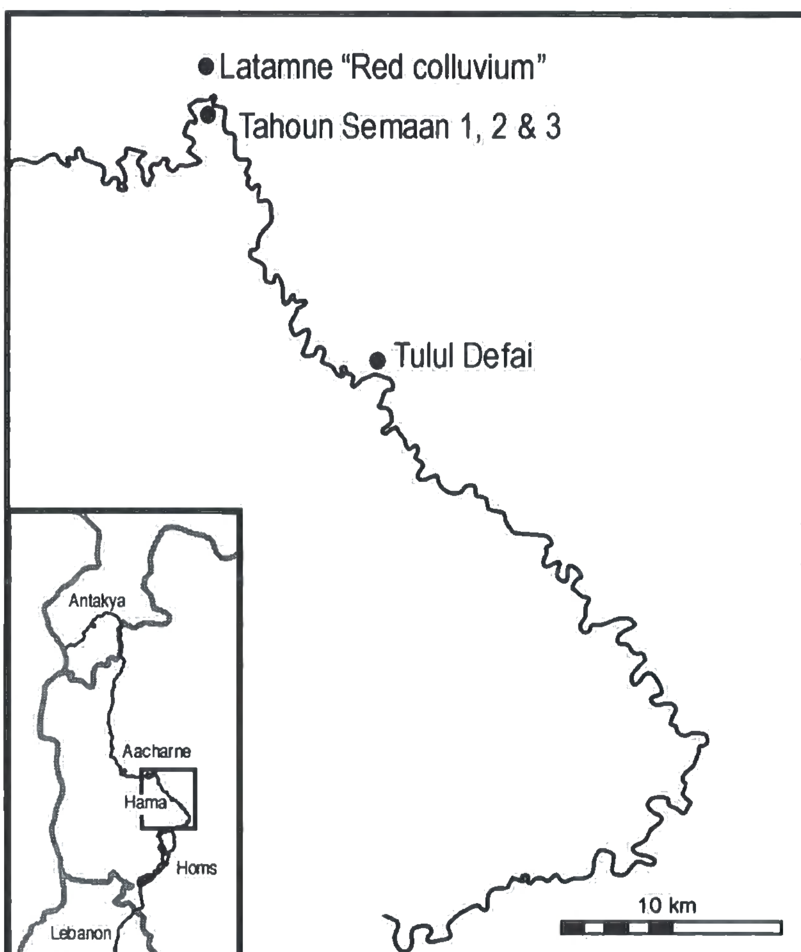

Figure 6.1.1 Location map illustrating the position of all sites referred to in chapter 6.

A total of five Middle Palaeolithic assemblages are considered in this chapter. Three of the collections constitute surface finds; Tahoun Semaan 2 and 3, which are from two adjacent findspots that essentially form a single large surface scatter, and Tulul Defai, which consists of a large collection of artefacts recovered from a thin soil directly overlying the local bedrock. The other two collections; Latamne "Red colluvium" and Tahoun Semaan 1, constitute much smaller artefact collections, but were recovered *in-situ* from Pleistocene deposits. Unlike some of the Lower Palaeolithic assemblages from the Orontes Valley considered previously, no fluvially abraded material is analysed in this chapter. Consequently, all these assemblages have the potential to provide information relating to hominin technological decision making and landscape-use at particular places in the Orontes Valley. However, as will be seen, these collections also frequently enable us to draw some notable conclusions regarding human behaviour in the wider landscape.

Discussion of the Middle Palaeolithic sites selected for analysis first involves consideration of their chronostratigraphic, geographic and taphonomic context. The latter is of particular value; despite the fact that none of the assemblages have undergone prolonged fluvial transport, they may have been subject to significant post-depositional disturbance. Furthermore, as they were all collected, not excavated, it is important to consider how representative these assemblages are of the material originally discarded at a particular location. Taking this information into consideration, a detailed technological analysis of each assemblage is then provided. On this basis, conclusions are advanced regarding hominin technological decision making at individual sites, which can frequently be used to infer information relating to wider hominin landscape-use practices. Subsequently, this information is then used to provide an assessment of Middle Palaeolithic technological practices and landscape-use in the Orontes Valley as a whole.

6.2 Tahoun Semaan 2 and 3

Location & History of Investigation

Tahoun Semaan is located ~2 km south of Latamne village on the south bank of the Orontes (see figure 6.1.1). Here, three artefact-bearing localities were identified during the course of the 1977 CNRS survey of the Pleistocene geology and Palaeolithic archaeology of the Orontes Valley (see chapter four, section 4.2). These findspots were labelled consecutively from Tahoun Semaan 1 through to Tahoun Semaan 3 (see figure 6.2.1; the Tahoun Semaan 1 site is discussed in section 6.5).

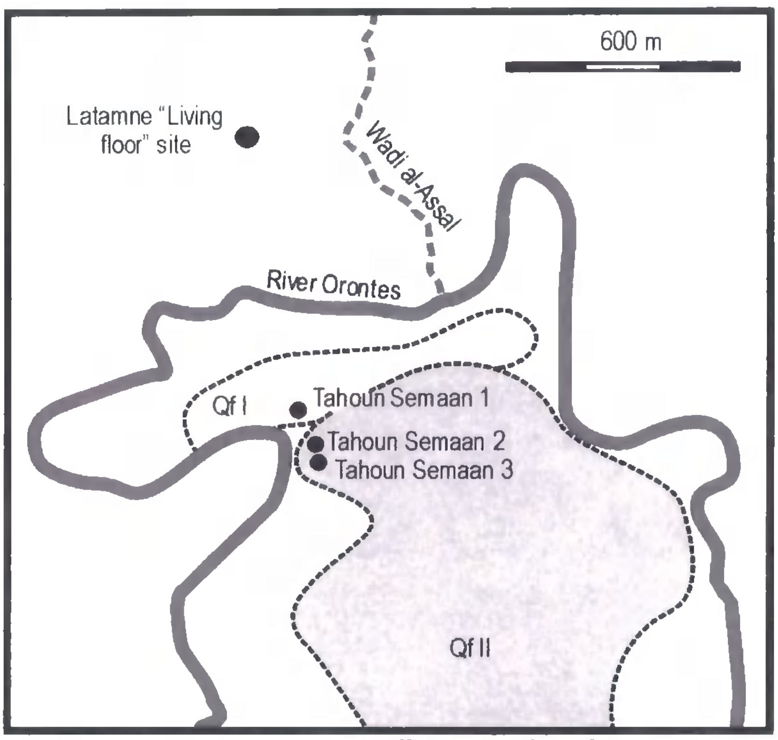

Figure 6.2.1 Location map illustrating the relative positions of Tahoun Semaan 1, 2 and 3.

At Tahoun Semaan 2, 395 artefacts were recovered from a field surface overlying a river terrace deposit. The fluvial gravels were exposed in a section cut for a cistern (Copeland and Hours 1993, 92). A second, smaller collection of artefacts was recovered from an adjacent field in a vineyard at Tahoun Semaan 3. Approximately 5 m below the Tahoun Semaan 3 findspot a second terrace exposure was noted (Copeland and Hours 1993, 92).

Geological Background & Preferred Dating

Although the original context of the Tahoun Semaan 2 and 3 lithics is not entirely certain, the CNRS survey team made the logical assumption that the fresh artefacts that they encountered originated from the terrace surface, and abraded artefacts from within the fluvial deposits (Copeland & Hours 1993, 92). The gravels at this locality are located 25-30 m above the modern Orontes and were assigned by De Heinzelin (1966, figure 3; 1968, figure

3) to his Mahrouka Formation (see chapter four, section 4.3) and to the Qf II formation by the CNRS survey team (Copeland and Hours 1993, 92; see chapter four, section 4.3 for an explanation of terrace nomenclature). It has therefore been suggested that the terrace gravels at Tahoun Semaan 2 and 3 can be broadly correlated with those at Jrabiyat 2, 3 and 4 (Bridgland *et al.* 2003, figure 5) which are argued to have been emplaced during MIS 8 (see chapter five, section 5.6).

On this basis, a date of MIS 8 is favoured here for Tahoun Semaan 2 and 3 fluvial deposits. Assuming that the abraded material originates from the terrace deposits, suggests that it was discarded by hominins either during, or prior to, MIS 8. Furthermore, if the fairly fresh material from these findspots originated from the surface of the terrace deposits, then it may have been deposited during MIS 7 after the aggradation of the terrace. However, due to the tentative dating of the fluvial deposits at Tahoun Semaan 2 and 3, and the fact that there is some uncertainty regarding the context of the archaeology, these dates should be regarded as provisional.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Tahoun Semaan 2		Tahoun Semaan 3		Combined	
	No. of artefacts	% of total	No. of artefacts	% of total	No. of artefacts	% of total
Levallois cores	27	7.1%	9	11.1%	36	7.8%
Simple prepared cores	2	0.5%	1	1.2%	3	0.6%
Non-Levallois cores	110	28.8%	20	24.7%	130	28.1%
Definite Levallois Flakes	4	1.0%	0	0.0%	4	0.9%
Probable Levallois flakes	7	1.8%	1	1.2%	8	1.7%
Possible Levallois flakes	4	1.0%	1	1.2%	5	1.1%
Handaxes	40	10.5%	22	27.2%	62	13.4%
Non-Levallois flakes	182	47.7%	27	33.4%	209	45.1%
Flake tools	6	1.6%	0	0.0%	6	1.3%
Total	382	100%	81	100%	463	100%

Table 6.2.1 Material analysed from Tahoun Semaan 2 and 3.

All the artefacts from Tahoun Semaan 2 and 3 housed in the collections of the National Museum in Damascus have been analysed. As these assemblages were recovered from adjacent landsurfaces and analogous contexts (see above), they are considered here to comprise a single large surface scatter. Consequently, they are presented as a combined collection constituting 463 artefacts (table 6.2.1).

Taphonomy of lithic assemblage

Cores from Tahoun Semaan 2 and 3 (n=169)					
Unabraded	111	65.7%	*No edge damage*	52	30.8%
Slightly abraded	55	32.5%	*Slight edge damage*	104	61.5%
Moderately abraded	2	1.2%	*Moderate edge damage*	13	7.7%
Heavily abraded	1	0.6%	*Heavy edge damage*	52	30.8%
Unstained	74	43.8%	*Unpatinated*	1	0.6%
Lightly stained	68	40.2%	*Lightly patinated*	22	13.0%
Moderately stained	24	14.2%	*Moderately patinated*	127	75.1%
Heavily stained	3	1.8%	*Heavily patinated*	19	11.2%
Unscratched	135	79.9%			
Lightly scratched	17	10.1%			
Moderately scratched	17	10.1%			
Heavily scratched	0	0.0%			

Table 6.2.2 Condition of all cores from Tahoun Semaan 2 and 3.

Handaxes from Tahoun Semaan 2 and 3 (n=62)					
Unabraded	23	37.1%	*No edge damage*	0	0.0%
Slightly abraded	18	29.0%	*Slight edge damage*	15	24.2%
Moderately abraded	11	17.7%	*Moderate edge damage*	34	54.8%
Heavily abraded	10	16.1%	*Heavy edge damage*	13	21.0%
Unstained	24	38.7%	*Unpatinated*	0	0.0%
Lightly stained	14	22.6%	*Lightly patinated*	6	9.7%
Moderately stained	7	11.3%	*Moderately patinated*	46	74.2%
Heavily stained	17	27.4%	*Heavily patinated*	10	16.1%
Unscratched	56	90.32%			
Lightly scratched	2	3.23%			
Moderately scratched	4	6.45%			
Heavily scratched	0	0.00%			

Table 6.2.3 Condition of all handaxes from Tahoun Semaan 2 and 3.

Flakes from Tahoun Semaan 2 and 3 (n=232)					
Unabraded	165	71.1%	*No edge damage*	0	0.0%
Slightly abraded	47	20.3%	*Slight edge damage*	26	11.2%
Moderately abraded	7	3.0%	*Moderate edge damage*	178	76.7%
Heavily abraded	13	5.6%	*Heavy edge damage*	28	12.1%
Unstained	155	66.8%	*Unpatinated*	0	0.0%
Lightly stained	40	17.2%	*Lightly patinated*	14	6.0%
Moderately stained	12	5.2%	*Moderately patinated*	194	83.6%
Heavily stained	25	10.8%	*Heavily patinated*	24	10.3%
Unscratched	212	91.4%			
Lightly scratched	14	6.0%			
Moderately scratched	5	2.2%			
Heavily scratched	1	0.4%			

Table 6.2.4 Condition of all flakes from Tahoun Semaan 2 and 3.

Taphonomic data relating to the Tahoun Semaan 2 and 3 artefacts (tables 6.2.2, 6.2.3 and 6.2.4) supports the observations made by Copeland & Hours (1993, 92) that flakes, cores and handaxes in two distinct condition states can be delimited. Most artefacts from the findspots are fresh, or only slightly abraded (90.5%). However, a smaller collection displays moderate and heavy levels of abrasion (9.5%). A similar division is discernable between artefacts which are unstained or only slightly stained (81.0%) and material which displays moderate to heavy staining (19.0%). Arguably, this data supports an association between fluvially abraded artefacts and the body of the Tahoun Semaan fluvial deposits, whilst the fresher material is likely to come from the surface of the gravels (Copeland and Hours 1993, 92).

Although the majority of the artefacts from Tahoun Semaan 2 and 3 are in fresh condition, all display a degree of edge damage, and most fall into the moderate category (79.9%). As the artefacts are from a surface collection, to some extent this probably reflects the effects of modern plough damage. Other contributory factors include fluvial reworking of the abraded artefacts, and damage to the fresher material caused by trampling and curation practices. A number of the artefacts from Tahoun Semaan 2 and 3 (13.0%) display evidence of surface scratching indicative of the prolonged exposure of artefacts on a land surface (Stapert 1976). As it is only found on the fresher artefacts in the collections (data not presented), the presence of this surface modification could indicate that these artefacts were exposed on the surface of the Tahoun Semaan gravels for a prolonged period of time. However, the data could also indicate that the artefacts were exposed on the modern land surface for a significant period prior to their recovery.

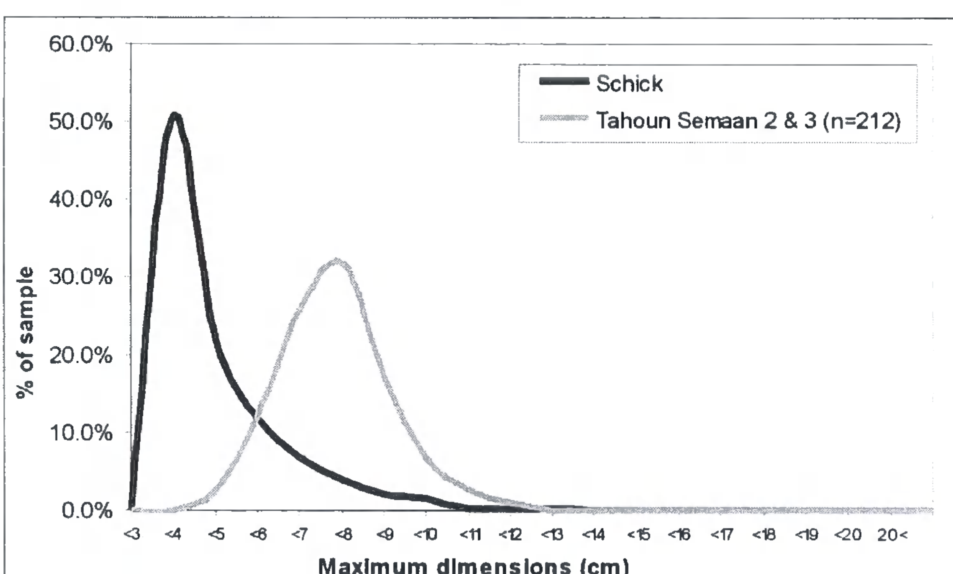

Figure 6.2.2 Comparison of maximum dimension of debitage larger than 2 cm recovered from Tahoun Semaan 2 and 3, and experimental data generated by Schick (1986).

Given that the moderately and heavily abraded artefacts in the Tahoun Semaan 2 and 3 collections are clearly reworked, further analysis has focussed on the fresher component. Comparison has been made between the maximum dimension of flakes in fresh and slightly abraded condition from the two findspots and Schick's (1986) data produced during experimental non-prepared core reduction (figure 6.2.2). This shows that flakes under 5 cm are heavily under-represented in the Tahoun Semaan 2 and 3 collections, a fact which is perhaps to be expected, since the material from the site was collected, and not systematically excavated.

Technology of lithic assemblage

Raw Material

	Levallois cores (n=36)	Non-Levallois cores (n=127)	Handaxes (n=41)	Non-Levallois flakes (n=196)
Raw material				
Fresh	47.2%	59.8%	34.1%	54.6%
Derived	36.1%	26.0%	29.3%	19.9%
Indeterminate	16.7%	14.2%	36.6%	25.5%
Blank form				
Nodule	8.3%	36.3%	29.3%	-
Shattered Nodule	0.0%	9.4%	0.0%	-
Flake	0.0%	3.1%	2.4%	-
Thermal flake	0.0%	0.0%	2.4%	-
Indeterminate	91.7%	51.2%	65.9%	-

Table 6.2.5 Raw material and inferred blank form for artefacts studied from Tahoun Semaan 2 and 3 (simple prepared cores and Levallois flakes are excluded due to small sample size).

All the fresh/slightly abraded artefacts studied from Tahoun Semaan 2 and 3 were produced on coarse-grained chert/flint. Both fresh and derived raw material sources were used in the production of all the main artefacts classes, although in each case, fresh examples are better represented (table 6.2.5). The most likely source of the derived raw material exploited is the gravels on which the artefacts have been deposited. The exact location of the primary raw material source(s) exploited is unknown. However, Cretaceous chalk/limestone bedrock (which potentially contains outcropping primary sources of chert/flint) has been noted ~0.5 km south of these findspots (De Heinzelin 1966 figure 3; 1968, figure 3), whilst chert/flint is recorded as outcropping from chalk/limestone bedrock at Latamne, which is located ~1 km north of Tahoun Semaan on the opposite bank of the modern river (see chapter five, section 5.4).

Regardless of artefact class, similar blank forms were worked during the reduction of the cores and handaxes recovered from Tahoun Semaan 2 and 3 (table 6.2.5). Most artefacts (60.4%) do not retain enough evidence to assess the form of the blank that was worked.

However, nodules were most frequently exploited (30.9%), although occasionally flakes (2.9%; including one thermal flake), or extensively fractured blanks (5.8%) were also used.

Levallois Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	72.1	61.7	25.1	118.8	0.89	0.41
Median	69.0	63.3	23.5	106.0	0.88	0.40
Min	46.2	43.6	13.4	37.0	0.37	0.25
Max	160.8	86.9	43.1	300.0	1.23	0.65
St. Dev.	21.1	11.4	7.3	64.7	0.17	0.10

Table 6.2.6 Tahoun Semaan 2 and 3 Levallois cores summary statistics (n=33; fragments excluded).

Levallois cores in the selected artefact samples from Tahoun Semaan 2 and 3 tend to be small (see table 6.2.6) and round in planform (see figure 6.2.3). Many were fairly thin when discarded (see figure 6.2.4), indicating that these cores had been extensively reduced. However, further reduction of a substantial proportion of the assemblage was also clearly possible.

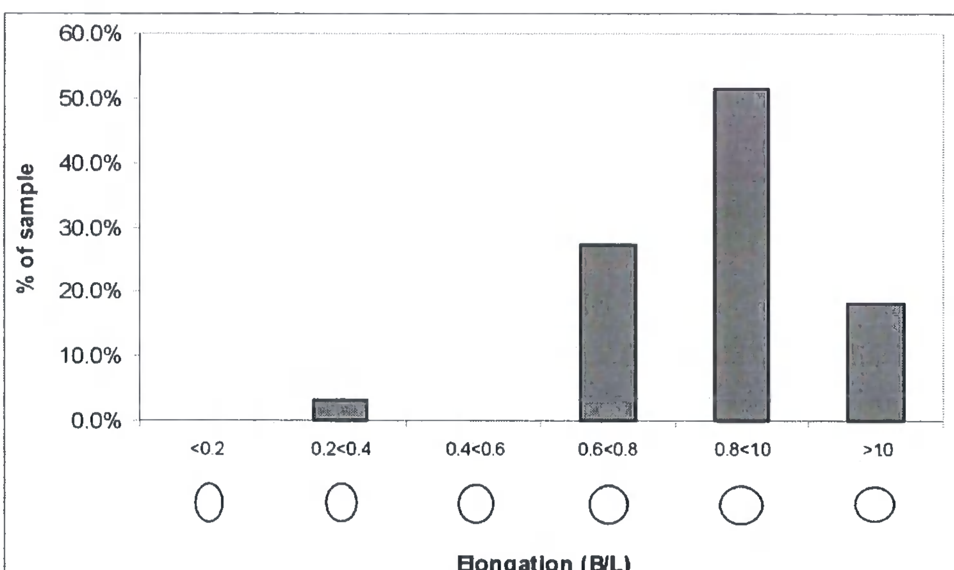

Figure 6.2.3 Elongation of Levallois cores from Tahoun Semaan 2 and 3 (n=33; fragments excluded).

Although the Levallois cores from the two findspots were generally quite flat when discarded, their size could have potentially allowed many of them to be reconfigured, enabling products to be detached from a flaking surface. Reworking the striking platform surface would have allowed the recreation of an exploitable, but markedly smaller, Levallois flaking surface, which would therefore have produced smaller Levallois products. As this approach seems not to have been undertaken at Tahoun Semaan 2 and 3, it is likely that large, broad products were desired, and that techniques were not adopted which might have resulted in the production of smaller products; rather, the flaking surface was worked back until it could no longer be reconfigured. Flakes were the most common endproduct removed from the final flaking surface of the cores studied (57.6%; table 6.2.7).

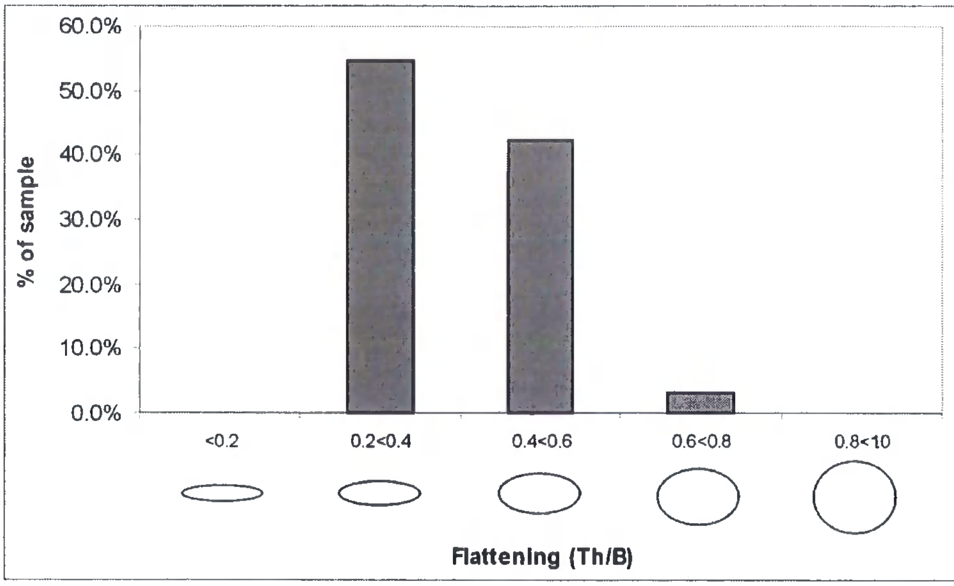

Figure 6.2.4 Flattening of Levallois cores from Tahoun Semaan 2 and 3 (n=33; fragments excluded).

The striking platform surfaces on the Tahoun Semaan 2 and 3 cores are flat to gently curved (personal observation), retain relatively high amounts of cortex, and many (30.3%) exhibit remnants of the distal ends of large flake scars (table 6.2.7). This indicates that the cores themselves were originally fairly large, but have been subject to extensive exploitation, although this working was concentrated solely upon the flaking surface. Significantly, a number of Levallois cores retain scars on the flaking surfaces that indicate re-preparation following an earlier exploitation phase, but are unexploited (18.2%), or display evidence that the final removal failed to detach successfully (12.1%).

The majority of the Levallois cores analysed (81.8%) reflect centripetal preparation of the final flaking surface, the convexities necessary for Levallois flaking generally being imposed through continuous shaping of the whole surface. Notably, several studies suggest that centripetal preparatory strategies are common towards the end of cyclical surface re-preparation (e.g. Dibble 1995, Meignen 1995). Examples prepared using bipolar (12.1%) and convergent unipolar (6.1%) preparatory techniques are also evident in small numbers. Most cores reflect the removal of only a single flake from the final flaking surface (lineal exploitation = 42.4%). Examples of recurrent techniques, including unipolar (12.1%), bipolar (6.1%) and centripetal recurrent exploitation (6.1%), were also encountered. The cores discarded at Tahoun Semaan 2 and 3 therefore seem to reflect the maximisation of production from individual Levallois flaking surfaces, either through cyclical re-preparation, or recurrent exploitation.

Levallois cores; technological observations (n=33)

Preparation method (n=33)		
Bipolar	4	12.1%
Convergent unipolar	2	6.1%
Centripetal	27	81.8%
Preparatory scars on flaking surface (n=33)		
1-5	16	48.5%
6-10	15	45.5%
11-15	1	3.0%
>15	1	3.0%
Position of cortex on striking platform (n=33)		
None	2	6.1%
One edge only	4	12.1%
More than one edge	0	0.0%
All over	7	21.2%
Central	9	27.3%
Central and one edge	5	15.2%
Central and more than one edge	6	18.2%
Levallois products from flaking surface (n=33)		
0	8	24.2%
1	16	48.5%
2	7	21.2%
3	2	6.1%
Earlier flaking surface (n=33)		
Yes	6	18.2%
No	27	81.8%
Remnant distals on striking platform (n=33)		
Yes	10	30.3%
No	23	69.7%

Exploitation method (n=33)		
Unexploited	1	3.0%
Lineal	14	42.4%
Unipolar recurrent	4	12.1%
Bipolar recurrent	2	6.1%
Centripetal recurrent	2	6.1%
Re-prepared but unexploited	6	18.2%
Failed final removal	4	12.1%
Preparatory scars on striking platform (n=33)		
1-5	14	42.4%
6-10	16	48.5%
11-15	1	3.0%
>15	2	6.1%
Percentage cortex on striking surface (n=33)		
0	2	6.1%
>0-25%	6	18.2%
>25-50%	8	24.2%
>50-75%	14	42.4%
>75%	3	9.1%
Type of products from flaking surface (n=33)		
Unexploited	7	21.2%
Flake	19	57.6%
Debordant	1	3.0%
Debordant and overshot	2	6.1%
Failed removal	4	12.1%

Dimension of final Levallois products (n=34)			
Min Length	24.7	*Min Breadth*	16.9
Max Length	75.1	*Max Breadth*	48.8
Mean Length	46.1	*Mean Breadth*	33.9

Table 6.2.7 Technological observations for Levallois cores from Tahoun Semaan 2 and 3 (fragments excluded).

When the raw material used to produce the Tahoun Semaan 2 and 3 Levallois cores is considered, it seems that most of the flattest examples (Th/B = 0.2-0.3) were prepared upon nodules of fresh chert/flint (see figure 6.2.5). In contrast, the thicker cores (Th/B = >0.5), with the greatest potential for further reduction, are without exception formed on fluvially abraded clasts - such as would be immediately available at the site from the gravels upon which this material was probably discarded. It is arguably possible, therefore, to look beyond Tahoun Semaan and consider hominin behaviour in the wider landscape. It seems likely that these locations represent places at which raw material was available, and where cores which had been carried around the landscape and progressively reduced, were discarded.

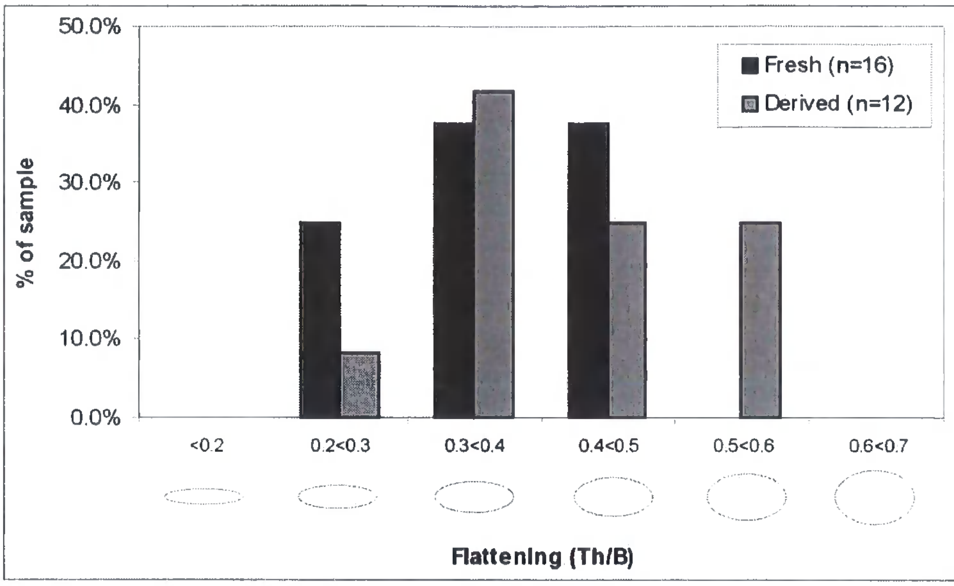

Figure 6.2.5 Flattening of Levallois cores from Tahoun Semaan 2 and 3 illustrated according to source of raw material used (n=28; fragments and examples on blanks lacking evidence of the source of the raw material exploited are excluded).

Simple Prepared Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
TS 2/615	98.5	87.4	38	332.0	0.89	0.43
TS 2/207	53.8	45.2	18.4	207.0	0.84	0.41
Tah S 3/441	61.6	63.5	33.6	143.0	1.03	0.53

Table 6.2.8 Tahoun Semaan 2 and 3 simple prepared cores summary statistics.

Simple prepares cores; technological observations (n=3)						
Exploitation method (n=3)			Preparatory scars on striking platform (n=3)			
Unipolar recurrent	2	66.7%	1-5		3	100%
Bipolar recurrent	1	33.3%				
Percentage cortex on striking surface (n=3)			Position of cortex on striking platform (n=3)			
0	0	0.0%	*All over*		2	66.7%
>0-25%	1	33.3%	*Central and more than one edge*		1	33.3%
>25-50%	0	0.0%				
>50-75%	1	33.3%				
>75%	1	33.3%				
Products from final flaking surface (n=3)			Dimension of final Levallois products			
0	0	0.0%	*Min Length*	34.9	*Min Breadth*	18.9
1	0	0.0%	*Max Length*	59.2	*Max Breadth*	57.3
2	2	66.7%	*Mean Length*	47.2	*Mean Breadth*	36.1
3	0	0.0%				
4	1	33.3%	Remnant distals on striking platform (n=33)			
			Yes		0	0%
			No		3	100%

Table 6.2.9 Technological observations for simple prepared cores from Tahoun Semaan 2 and 3.

Three simple prepared cores were identified in the selected artefact samples from Tahoun Semaan 2 and 3. These cores possess all the features of Boëda's (1986, 1995) volumetric definition of the Levallois method (see chapter three), but lack evidence for deliberate configuration of the flaking surface. They are small and are round in planform (see table 6.2.8). Further reduction of all three was clearly possible (Th/B = >0.4), although the small size of two of the cores would have resulted in the production of small products. As the Levallois core data suggests that large broad products were desired by the Tahoun Semaan knappers, the size of two of the simple prepared cores could arguably have resulted in their discard even though further removals from their final flaking surface seem to have been possible. The technological attributes of the three simple prepared cores from Tahoun Semaan 2 and 3 (table 6.2.9) fit easily within the continuum of variation observed for the Levallois cores.

Levallois Products

	Type	Portion	Butt	Prep. scars	Prep. method	Exploit. method	Length (mm)	Breadth (mm)	Thick. (mm)	Elong. (B/L)
1	Ind.	Prox.	Facetted	3	Uni-polar	Single removal	44.2	42.2	11.2	n/a
2	Flake	Whole	Plain	3	Converg. Unipolar	Single removal	40.8	33.1	9.4	0.81
3	Deb. flake	Whole	Obscured	7	Converg. Unipolar	Single removal	74.8	43.1	19.3	0.58
4	Flake	Prox.	Obscured	4	Converg. Unipolar	Single removal	48.3	38.8	10.5	n/a

Table 6.2.10 Summary statistics and technological observations for definite Levallois products from Tahoun Semaan 2.

Only four definite Levallois products were identified in the selected artefact samples, all of which are from Tahoun Semaan 2 (table 6.2.10). All are classed as single removals that do not retain any evidence of previous Levallois flake scars, but which cannot be definitively said to reflect lineal exploitation of a Levallois core, since they could potentially have been followed by another removal. Three are the result of convergent unipolar preparation of the flaking surface of the core from which they were detached, while the other example retains evidence of unipolar preparation. The two whole products are small and medium-sized, and therefore could have been removed from cores found at the site.

Non-Levallois Cores

The non-Levallois core assemblages from the Tahoun Semaan 2 and 3 are dominated by migrating platform cores (80.0%; table 6.2.12). They tend to be a similar size, in terms of their maximum dimensions, to the Levallois and simple prepared cores from the two locales. However, they also tend to be heavier (see tables 6.2.6, 6.2.8 and 6.2.11). This probably reflects the globular profile of the non-Levallois cores, in contrast to the lenticular outline of the exhausted Levallois and simple-prepared cores. No variation is apparent between non-Levallois cores characterized by different overall reduction strategies (data not presented).

	Maximum dimensions (mm)	Weight (grams)
Mean	75.2	170.6
Median	72.8	146.5
Min	49.4	43.0
Max	125.2	502.0
St.Dev.	14.2	88.8

Table 6.2.11 Tahoun Semaan 2 and 3 non-Levallois cores summary statistics (n=111; fragments excluded).

Non-Levallois cores; technological observations (n=127)					
Overall core reduction (n=127)			Core episodes (n=357)		
Migrating platform cores	94	80.0%	*Type A: Single Removal*	27	7.6%
Single platform unprepared	5	13.3%	*Type B: Parallel flaking*	49	13.7%
Discoidal	12	1.3%	*Type C: Alternate flaking*	162	45.4%
Fragment	16	1.3%	*Type D: Unattributed removal*	119	33.3%
Flake scars/core (n=111)			Core episodes/core		
1-5	9	8.1%	*Min*	1	-
6-10	54	48.6%	*Max*	8	-
11-15	40	36.0%	*Mean*	2.9	-
>15	8	7.2%			
Max	19	-	Flake scars/core episode		
Mean	10.2	-	*Min*	1	-
			Max	18	-
% Cortex (n=111)			*Mean*	3.5	-
0	14	12.6%			
>0-25%	41	36.9%	Blank form retained? (n=111)		
>25-50%	36	32.4%	*Yes*	52	46.8%
>50-75%	20	18.0%	*No*	59	53.2%
>75%	0	0.0%			

Table 6.2.12 Technological observations for non-Levallois cores from Tahoun Semaan 2 and 3.

The reduction of the non-Levallois cores from the Tahoun Semaan 2 and 3 was moderately intensive, with an average of 10.2 flake scars per core (table 6.2.12). However, the average number of episodes per core is limited to 2.9, while the average core episode involved just 3.5 removals. In addition, cortex retention on the non-Levallois cores is relatively high with 87.4% possessing some cortex, and just over half (50.4%) displaying cortex on more than 25% of their surface area. This data suggests that although the Levallois and non-Levallois cores in the collections from Tahoun Semaan 2 and 3 were of a similar size when discarded, the non-Levallois cores are generally produced on smaller nodules that were not as intensively reduced.

The reduction of non-Levallois cores from Tahoun Semaan 2 and 3 almost exclusively involved a nodular blank (36.3%), or a fractured nodule (9.4%; table 6.2.5). As many of the non-Levallois cores possess fresh chalky cortex (59.8%; table 6.2.5) indicative of chert/flint from a primary bedrock source not immediately available at Tahoun Semaan, some of the non-Levallois cores, or the blanks on which they were produced, must have been brought into the site from elsewhere in the landscape. A smaller number of cores (26.0%) possess fluvially modified cortex and could potentially have been produced using the river gravels associated with Tahoun Semaan 2 and 3 findspots.

Handaxes

A total of 16 whole handaxes, two roughouts and 23 fragments were recorded in the selected artefact samples from Tahoun Semaan 2 and 3. The high number of fragments is noteworthy, particularly since the break surfaces display the same degree of patination as the rest of the artefacts, indicating that the damage did not occur in the recent past. As a result, it is possible that many of these handaxe fragments represent artefacts that were broken during manufacture or use at Tahoun Semaan 2 and 3.

	Length (mm)	Breadth (mm)	Thickness (mm)
Mean	92.0	69.0	35.7
Median	91.8	66.2	30.0
Min	63.8	44.7	23.6
Max	138.2	98.0	62.4
St.Dev.	19.0	13.6	11.0

Table 6.2.13 Tahoun Semaan 2 and 3 handaxe summary statistics (n=16; fragments excluded).

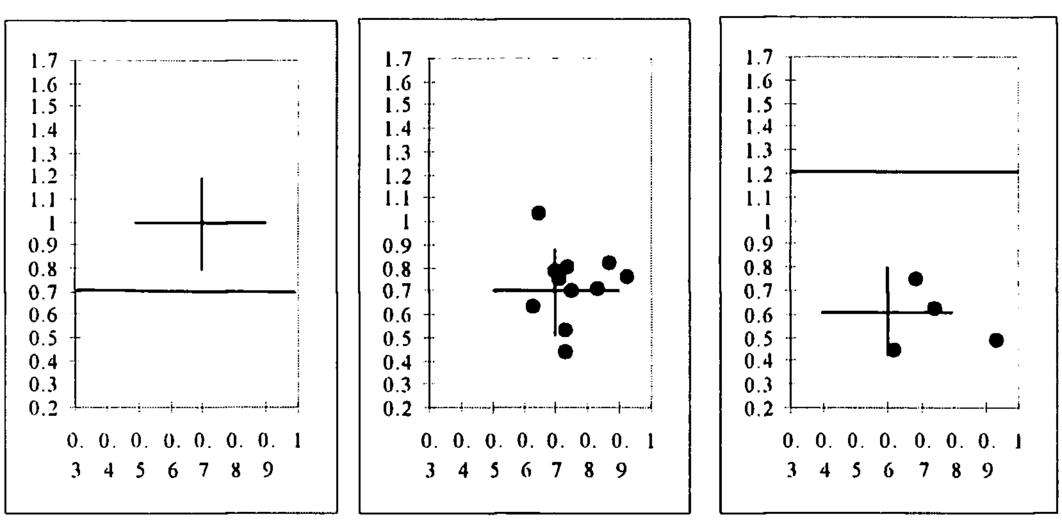

Figure 6.2.6 Tripartite diagrams for whole handaxes studied from Tahoun Semaan 2 and 3 (n=16).

The complete handaxes in the collections tend to be quite small (see table 6.2.13) and ovate in planform (see figure 6.2.6). Examples worked using a hard (48.8%) and a soft percussor (34.1%) are both commonly encountered (table 6.2.14). This division is reflected in the levels of refinement displayed by the handaxes (see figure 6.2.7), with those produced using a soft hammer percussor displaying generally high levels of refinement, while examples produced using a hard hammer frequently exhibit low levels of refinement. Scar counts on the handaxes from Tahoun Semaan 2 and 3 tend to be high, with an average of 19.5 flake scars on whole pieces (table 6.2.14). They tend to retain a moderate amount of cortex, although exactly a quarter of the complete examples have been fully decorticated. Cortex retention on the handaxes in the selected sample tends to be located in patches all over the handaxe (50.0%), or restricted to the butt (18.8%). The majority (56.3%) possess a cutting edge on most or all of their edges, but dull butts, while a significant number (31.3%) have a cutting edge around their entire circumference.

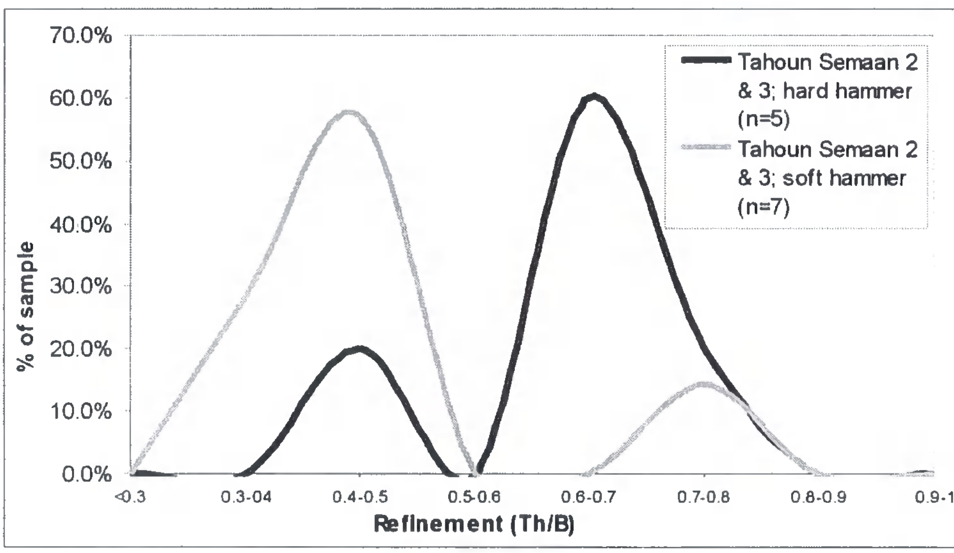

Figure 6.2.7 Levels of refinement for all whole handaxes studied from Tahoun Semaan 2 and 3 reduced using a hard and a soft hammer.

Handaxes and handaxe fragments from Tahoun Semaan 2 and 3 which retain cortex indicative of raw material source, demonstrate evidence for the use of flint/chert originating from both primary bedrock source(s) (34.1%) and secondary fluvial contexts (29.3%; table 6.2.5). While the latter would have been immediately available at the Tahoun Semaan findspots, the former would not. This demonstrates that some of the handaxes, or possibly the raw material used in their reduction, was brought into the Tahoun Semaan 2 and 3 from elsewhere in the landscape. It also indicates that others could, potentially, have been produced on raw material found at the locales.

The general picture to emerge from the handaxe samples from Tahoun Semaan 2 and 3 is that within the broad continuum of variability represented, two distinct sub-groups are apparent. The first tend to have been worked using a soft hammer and possess high levels of refinement, while the second tend to have been worked using a hard hammer and possess low levels of refinement. It could be suggested that these reflect two stages along a continuum of reduction; unrefined, hard hammer pieces may actually represent roughouts, in contrast to finished examples. Many of the latter, which are under-represented in the collections in comparison to fragments, may have been taken away for use elsewhere. Alternatively, these differences might reflect technologically distinct approaches to handaxe production, which may relate to volumetric constraints imposed by certain nodules (*cf.* handaxes from the Latamne "Living floor" site; see chapter five, section 5.4), or the practices of different individuals or hominin groups.

Handaxes; technological observations (n=41)					
Portion (n=41)			Hammer mode (n=41)		
Whole	16	39.0%	*Hard*	20	48.8%
Roughout	2	4.9%	*Soft*	14	34.1%
Tip	2	4.9%	*Mixed*	3	7.3%
Butt	16	39.0%	*Indeterminate*	4	9.8%
Fragment	5	12.2%			
Cortex retention (n=16)			Cortex position (n=16)		
0	4	25.0%	*None*	4	25.0%
>0-25%	5	31.3%	*Butt only*	3	18.8%
>25-50%	6	37.5%	*Butt and edges*	1	6.3%
>50-75%	1	6.3%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	0	0.0%
			All over	8	50.0%
Evidence of blank dimensions? (n=16)			Edge Position (n=16)		
No	7	43.8%	*All round*	5	31.3%
1 dimension	4	25.0%	*All edges sharp, dull butt*	4	25.0%
2 dimension	5	31.3%	*Most edges sharp, dull butt*	5	31.3%
			One sharp edge, dull butt	2	12.5%
Butt working (n=16)			Length of cutting edge in mm (n=16)		
Unworked	4	25.0%	*Min*	5	-
Partially worked	7	43.8%	*Max*	31	-
Fully worked	5	31.3%	*Mean*	18.6	-
Obscured	4	25.0%			
Scar Count (n=36)					
Min	13	-			
Max	28	-			
Mean	19.5	-			

Table 6.2.14 Technological observations for handaxes from Tahoun Semaan 2 and 3.

Non-Levallois Flakes

The majority of the non-Levallois flakes in the selected sample from Tahoun Semaan 2 and 3 are medium-sized (see table 6.2.15) and were produced using a hard hammer (91.3%), although five definite soft hammer flakes were also present, potentially indicative of handaxe thinning (table 6.2.16). They display high scar counts, with 42.5 % possessing four or more flake scars on their dorsal surface, while unidirectional (52.1%) and multi-directional (36.2%) scar patterns dominate. Both of these observations could reflect either handaxe production, or Levallois flaking. Interestingly, 54.6% of the flakes retain fresh chalky cortex (table 6.2.5) indicating that they were detached from chert/flint blanks from a primary source(s). As such raw material is not immediately available at Tahoun Semaan 2 and 3, this suggests that the reduction of blanks obtained elsewhere in the landscape took place at these locales.

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	60.6	50.3	19.5
Median	61.1	49.3	18.4
Min	28.7	25.4	8.3
Max	106.1	94.3	72.0
St.Dev.	14.9	13.6	7.4

Table 6.2.15 Tahoun Semaan 2 and 3 non-Levallois flakes summary statistics (n=163; fragments excluded).

Non-Levallois flakes; technological observations (n=196)					
Portion (n=196)			Dorsal scars (n=163)		
Whole	163	83.2%	0	10	6.1%
Proximal	2	1.0%	1	17	10.4%
Distal	19	9.7%	2	36	22.1%
Mesial	2	1.0%	3	29	17.8%
Siret	10	5.1%	4	30	18.4%
			5	14	8.6%
			>5	24	14.7%
			Obscured	3	1.8%
Dorsal cortex retention (n=163)			Dorsal scar pattern (n=163)		
100%	10	6.1%	*Uni-directional*	85	52.1%
>50%	28	17.2%	*Bi-directional*	6	3.7%
<50%	91	55.8%	*Multi-directional*	59	36.2%
0%	31	19.0%	*Wholly cortical*	10	6.1%
Obscured	3	1.8%	*Obscured*	3	1.8%
Butt type (n=196)			Hammer mode (n=196)		
Plain	81	41.3%	*Hard*	179	91.3%
Dihedral	8	4.1%	*Soft*	5	2.6%
Cortical	22	11.2%	*Indeterminate*	12	6.1%
Natural (but non-cortical)	3	1.5%			
Marginal	5	2.6%	Relict core edge(s) (n=163)		
Mixed	6	3.1%	*Yes*	52	31.9%
Soft hammer	4	2.0%	*No*	110	67.5%
Facetted	2	1.0%	*Obscured*	1	0.6%
Obscured	43	21.9%			
Missing	22	11.2%			

Table 6.2.16 Technological observations for non-Levallois flakes from Tahoun Semaan 2 and 3.

Comparison between the distribution of cortex retention on the non-Levallois flake assemblage from Tahoun Semaan 2 and 3 with Ashton's (1998b) data for cortex retention on flakes produced during experimental core and handaxe reduction (figure 6.2.8) has produced a generally good correlation between the archaeological and experimental datasets, although fully cortical flakes do appear to be under-represented in the Tahoun Semaan 2 and 3 collections. It is difficult to gauge whether this difference has any significance in terms of hominin technological decision making, as it could arguably reflect difficulties identifying fully cortical products during surface collection. Consequently, it seems that the flakes recovered from Tahoun Semaan 2 and 3 are representative of fairly complete knapping sequences, although it is possible that initial decortication of blanks sometimes occurred elsewhere.

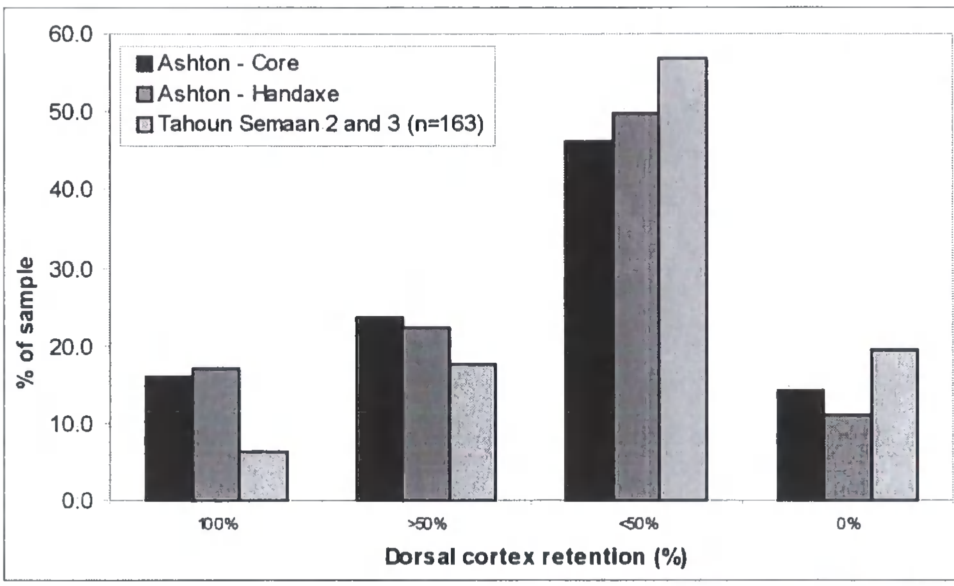

Figure 6.2.8 Comparison of percentage dorsal cortex rentention on non-Levallois flakes from Tahoun Semaan 2 and 3, and experimental data generated by Ashton (1998b) for core and handaxe reduction.

Retouched Tools

Nature of retouch on modified flakes (n=6)			
Position		Location	
Direct	5	*Proximal*	3
Bifacial	1	*Distal*	1
		One lateral edge	1
		Continuous, except butt	1
Distribution		Edge form	
Continuous	6	*Rectilinear*	4
		Convex	2
Extent of retouch		Angle of retouched edge	
Minimally invasive	2	*Abrupt*	3
Semi-Invasive	1	*Semi abrupt*	3
Invasive	3		
Regularity of retouched edge		Morphology of retouch	
Regular	5	*Scaly*	2
Irregular	1	*Stepped*	2
		Parallel	2

Table 6.2.17 Nature of retouch on modified flakes from Tahoun Semaan 2.

Only six retouched artefact were identified in the collections studied, all of which are on non-Levallois flakes recovered from Tahoun Semaan 2. The nature and position of the retouch on these artefacts is presented in table 6.2.17.

Technology and Hominin Behaviour

The material studied from Tahoun Semaan 2 and 3 is divisible into two groups; a small number of fluvially derived artefacts associated with the Orontes deposits found at the findspots, and a larger body of fresh material deposited directly on top of the gravels. This analysis has focussed upon the latter; whilst constituting a time-averaged palimpsest, this material reflects ongoing technological practices at the sites and their wider landscape setting during the period at which the gravels were exposed (an unknown period following MIS 8, possibly MIS 7). Three key technological strategies can be identified; Levallois flaking, handaxe production and a more *ad hoc* approach to core working. This variety of technological approaches contrasts with the limited number attested by the Lower Palaeolithic assemblages dealt with in the previous chapter.

Despite being located directly on a source of derived raw material, all the artefact classes are dominated by the use of fresh raw material, indicating that the artefacts, or the original blanks, were brought into the sites from elsewhere. Although it is difficult to assess the actual distances involved in these transfers, some general inferences can be made. The fact that many of the Levallois cores from the sites, particularly those on fresh raw material, are nearing a state of exhaustion (frequently retaining evidence of failed final removals, or having been re-prepared but unexploited) suggests that they are from the very far end of the reduction spectrum. This indicates that they were discarded at the locales after extensive curation and use in the wider landscape, a suggestion supported by a lack of Levallois flakes in the Tahoun Semaan 2 and 3 collections, which were presumably detached from the cores elsewhere. Notably, similarly intense curation of Levallois cores has been recorded at Middle Palaeolithic sites in south-west France (e.g. Geneste 1989) and south-east England (Scott 2006).

The non-Levallois flake data suggests that, in contrast to the Levallois cores, other artefacts were extensively worked at Tahoun Semaan 2 and 3, as fairly complete knapping sequences seem to be present. As working of the non-Levallois cores does not appear to have been overly intensive or prolonged, it is likely that they were worked and discarded on-site, despite many of the blanks used being brought in from elsewhere. The fact that so many fragments of handaxes broken in antiquity were identified in the collections suggests that they too were manufactured at the site. This is potentially supported by the fact that the complete handaxes studied fall into two distinct sub-groups (the first worked using a hard hammer and possessing low levels of refinement, the second flaked using a soft hammer and possessing high levels of refinement) which could reflect an ongoing continuum of reduction. Futhermore, the comparative under-representation of complete examples raises the possibility that some handaxes were carried away from the sites for use elsewhere.

It is difficult to speculate as to whether the different technological patterns identified at Tahoun Semaan 2 and 3 were undertaken at the same time, or by different hominin groups, or by the same group in response to different needs. All artefacts imply a relationship with the wider landscape, as many are on raw material not directly available at the site; however, it is possible to infer differences in the relationships between particular artefact classes and aspects of hominin technological decision making and landscape-use. Notably, as at Tahoun Semaan, complex mixed technological signatures have been noted amongst Middle Palaeolithic surface scatters in Europe; notable examples include sites in the southern Limburg (Netherlands; Kolen *et al.* 1999, De Loecker 2006) as well as southern France (e.g. La Croix-Guérmard, Deux-Sèrvres; Mellars 1996).

6.3 Tulul Defai

Location & History of Investigation

During the course of the 1977 CNRS survey of the Pleistocene geology and Palaeolithic archaeology of the Middle Orontes (see chapter four, section 4.2) a large concentration of artefacts was encountered at Tulul Defai (Copeland and Hours 1993, 107). The site is situated ~8 km downstream from the city of Hama and on the east bank of the Orontes (see figure 6.3.1). A total of 766 artefacts were collected from the modern land surface by the CNRS team.

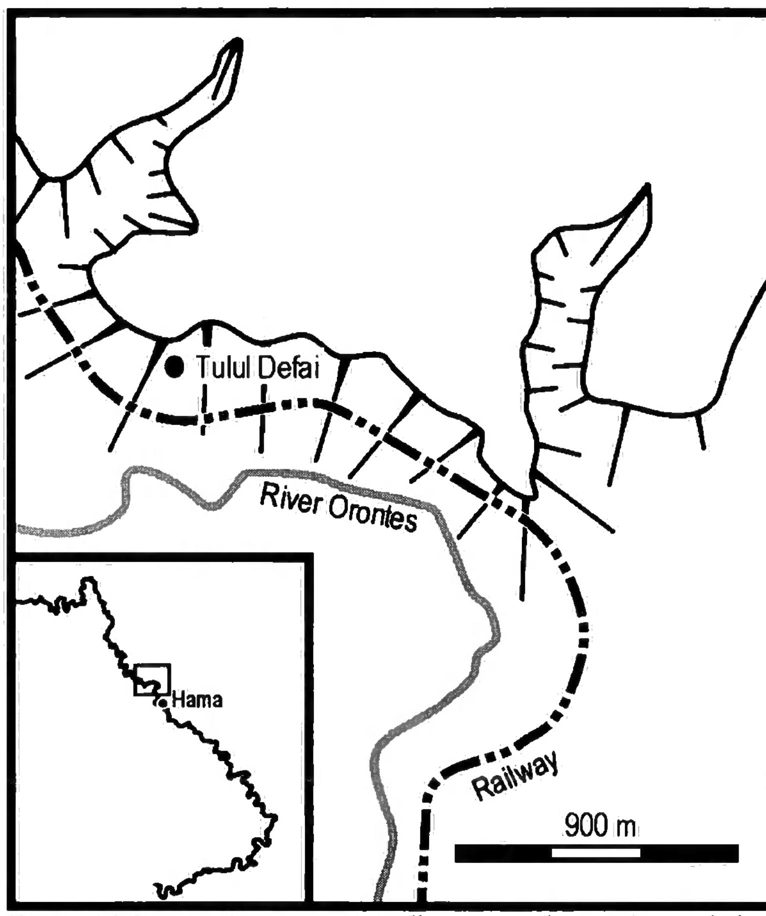

Figure 6.3.1 Location map illustrating the position of the Tulul Defai findspot.

Geological Background & Preferred Dating

The lithic scatter found at Tulul Defai was located on the plateau edge overlooking the Orontes Valley, in a thin soil directly overlying Cretaceous chalk/limestone bedrock (Copeland and Hours 1993, 107). Thus, the original context of the material could either have been the surface of the local solid geology, or an overlying soil which has subsequently been deflated. In the context of this research, the Tulul Defai locale is unique in that it is not associated with Pleistocene fluvial deposits.

No direct or indirect information is available with which to date the Tulul Defai artefact scatter. However, the assemblage as a whole is clearly typo-technologically Middle Palaeolithic and possesses similar attributes to the material from Tahoun Semaan 2 and 3 (see section 6.2 and below). As such, although no specific age estimation is possible for the Tulul Defai lithics, the assemblage can be considered to belong to the Middle Palaeolithic.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	No. of artefacts	% of total
Levallois cores	77	12.1%
Simple prepared cores	19	3.0%
Non-Levallois cores	184	29.0%
Definite Levallois Flakes	2	0.3%
Probable Levallois flakes	1	0.2%
Possible Levallois flakes	1	0.2%
Handaxes	53	8.3%
Non-Levallois flakes	289	45.5%
Flake tools	6	0.9%
Other tools	2	0.3%
Hammer stones	1	0.2%
Total	635	100%

Table 6.3.1 Material analysed from Tulul Defai (other tools = a retouched core and a retouched thermal flake).

All the artefacts from Tulul Defai that are housed in the collections of the National Museum in Damascus have been studied. A total of 635 artefacts were analysed (see table 6.3.1).

Taphonomy of lithic assemblage

Cores from Tulul Defai (n=281)					
Unabraded	145	51.6%	*No edge damage*	0	0.0%
Slightly abraded	94	33.5%	*Slight edge damage*	109	38.8%
Moderately abraded	39	13.9%	*Moderate edge damage*	149	53.0%
Heavily abraded	3	1.1%	*Heavy edge damage*	23	8.2%
Unstained	176	62.6%	*Unpatinated*	13	4.6%
Lightly stained	81	28.8%	*Lightly patinated*	87	31.0%
Moderately stained	21	7.5%	*Moderately patinated*	161	57.3%
Heavily stained	3	1.1%	*Heavily patinated*	20	7.1%
Unscratched	203	72.2%			
Lightly scratched	57	20.3%			
Moderately scratched	18	6.4%			
Heavily scratched	3	1.1%			

Table 6.3.2 Condition of all cores from Tulul Defai.

Handaxes from Tulul Defai (n=53)					
Unabraded	21	39.6%	*No edge damage*	0	0.0%
Slightly abraded	11	20.8%	*Slight edge damage*	16	30.2%
Moderately abraded	17	32.1%	*Moderate edge damage*	29	54.7%
Heavily abraded	4	7.5%	*Heavy edge damage*	8	15.1%
Unstained	29	54.7%	*Unpatinated*	0	0.0%
Lightly stained	19	35.8%	*Lightly patinated*	19	35.8%
Moderately stained	5	9.4%	*Moderately patinated*	27	50.9%
Heavily stained	0	0.0%	*Heavily patinated*	7	13.2%
Unscratched	36	67.9%			
Lightly scratched	7	13.2%			
Moderately scratched	8	15.1%			
Heavily scratched	2	3.8%			

Table 6.3.3 *Condition of all handaxes from Tulul Defai.*

Flakes from Tulul Defai (n=299)					
Unabraded	206	68.9%	*No edge damage*	2	0.7%
Slightly abraded	67	22.4%	*Slight edge damage*	44	14.7%
Moderately abraded	20	6.7%	*Moderate edge damage*	179	59.9%
Heavily abraded	6	2.0%	*Heavy edge damage*	74	24.7%
Unstained	157	52.5%	*Unpatinated*	38	12.7%
Lightly stained	107	35.8%	*Lightly patinated*	97	32.4%
Moderately stained	34	11.4%	*Moderately patinated*	149	49.8%
Heavily stained	1	0.3%	*Heavily patinated*	15	5.0%
Unscratched	241	80.6%			
Lightly scratched	39	13.0%			
Moderately scratched	17	5.7%			
Heavily scratched	2	0.7%			

Table 6.3.4 *Condition of all flakes from Tulul Defai.*

Taphonomic data relating to the Tulul Defai artefacts (tables 6.3.2, 6.3.3. and 6.3.4) attests to the fact that, although many of the cores, handaxes and flakes in the extant collection are in fresh condition (58.7%), a significant number of artefacts (41.3%) display slight to heavy levels of "abrasion." As the artefacts from Tulul Defai are not associated with a fluvial context, it would seem that sub-aerial processes are responsible for this surface modification. This suggests that many of the artefacts from the locale have lain on the land surface for a considerable period of time, a contention which is supported by the fact that 24.1% display evidence of scratching indicative of prolonged surface exposure (Stapert 1976). This extended exposure to the elements has arguably contributed to the fact that the vast majority (99.5%) display a degree of edge damage, as the artefacts are likely to have been subjected to trampling and plough damage.

Most of the artefacts from Tulul Defai display some degree of patination (91.8%); however, a number of unpatinated non-Levallois cores and non-Levallois flakes were identified. These unpatinated artefacts could represent an intrusive Holocene element in the Tulul Defai assemblage, a suggestion which is supported by the fact that all the handaxes, Levallois cores and Levallois flakes studied are patinated to some degree. As a consequence, the unpatinated artefacts in the Tulul Defai assemblage have been excluded from further analysis.

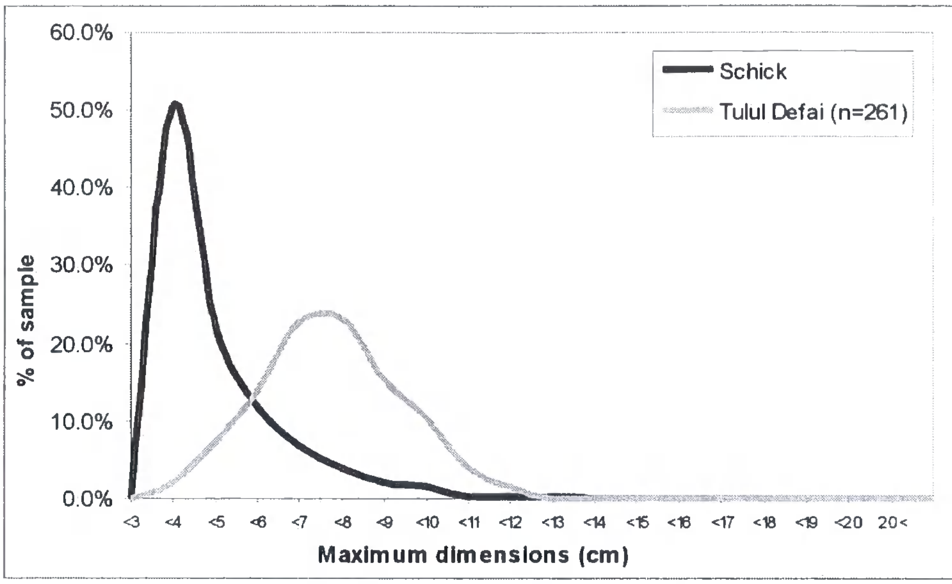

Figure 6.3.2 Comparison of maximum dimension of debitage larger than 2 cm recovered from Tulul Defai, and experimental data generated by Schick (1986).

In order to assess the degree of post-depositional disturbance the Tulul Defai assemblage has undergone, comparison has been made between the maximum dimension of the flakes from Tulul Defai and Schick's (1986) data produced during experimental non-prepared core reduction (figure 6.3.2). This shows that flakes under 5 cm are heavily under-represented in the Tulul Defai collection, which probably reflects the fact that material from the site was collected, and not systematically excavated.

Technology of lithic assemblage

Raw Material

All the artefacts from Tulul Defai were produced on coarse-grained chert/flint. Raw material from a primary source(s) was preferentially employed (see table 6.3.5). Small numbers of stone tools were produced using raw material from fluvial contexts, although such material is most frequently associated with the reduction of Levallois cores and handaxes (see table 6.3.5). The most prosaic source of the raw material from a primary context is the chert/flint blocks that have been recorded outcropping from chalk/limestone bedrock at the site (Copeland and Hours 1993, 107). The source of the fluvially-derived raw material is unknown. No fluvial deposits have been noted in the immediate vicinity of the site, though terrace gravels are present in the valley below (Besançon and Sanlaville 1993, 58).

	Levallois cores (n=77)	Simple prepared cores (n=19)	Migrating platform cores (n=104)	Discoidal cores (n=47)	Other cores (n=19)	Handaxes (n=53)	Non-Levallois flakes (n=257)
Raw							
Fresh	68.8%	68.4%	74.0%	61.7%	52.6%	45.3%	57.6%
Derived	11.7%	5.3%	2.9%	4.3%	5.3%	11.3%	3.1%
Indeterminate	15.6%	26.3%	23.1%	34.0%	42.1%	43.4%	39.3%
Blank form							
Nodule	7.8%	21.1%	20.2%	10.6%	15.8%	15.1%	-
Shattered	6.5%	15.8%	21.2%	12.8%	31.6%	0.0%	-
Flake	1.3%	5.3%	4.8%	2.1%	5.3%	5.7%	-
Thermal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-
Indeterminate	84.4%	57.9%	53.8%	74.5%	47.4.7%	79.2%	-

Table 6.3.5 Raw material and inferred blank form for artefacts studied from Tulul Defai (Levallois flakes exclude due to small sample size).

The majority of the cores and handaxes from Tulul Defai (68.4%; combined figure) do not retain enough evidence to assess the form of the original blanks (table 6.3.5). Where blank form can be identified, nodules (14.7%; combined figure) and extensively fractured blocks (13.2%; combined figure) were most commonly exploited. The fact that naturally fractured blanks were frequently employed in the reduction of the cores and handaxes from Tulul Defai probably reflects the fact the knappers were often exploiting primary chert/flint blocks which were exposed, and probably fragmented, by weathering.

Levallois Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	67.7	62.4	27.0	126.9	0.94	0.44
Median	68.0	62.4	23.6	108.0	0.94	0.42
Min	44.5	45.0	12.7	43.0	0.67	0.18
Max	118.0	87.0	61.0	434.0	1.52	0.91
St.Dev.	12.1	9.4	7.9	62.7	0.15	0.12

Table 6.3.6 Tulul Defai Levallois cores summary statistics (n=77).

A total of 77 Levallois cores were identified in the extant artefact collection from Tulul Defai. In general, they are small (see table 6.3.6) and rounded (see figure 6.3.3), and many were thin when discarded (see figure 6.3.4). This suggests that these cores were extensively reduced, although it also seems that some of the assemblage could potentially have been further worked. Many of the flattened Levallois cores from Tulul Defai are sufficiently large to have been re-prepared and new products produced. However, this would have required the reworking of the striking platform surface, in order to recreate sufficiently accentuated distal and lateral convexities. Such reworking would necessarily have reduced the size in plan of the exploitable flaking surface, with a concomitant effect upon the size of the Levallois products that could be removed from it. Reworking in this manner was not undertaken, suggesting that hominins actually wanted to produce large, broad products and did not follow reduction trajectories which would have produced smaller ones. A similar pattern is also apparent at Tahoun Semaan 2 and 3 (see section 6.2).

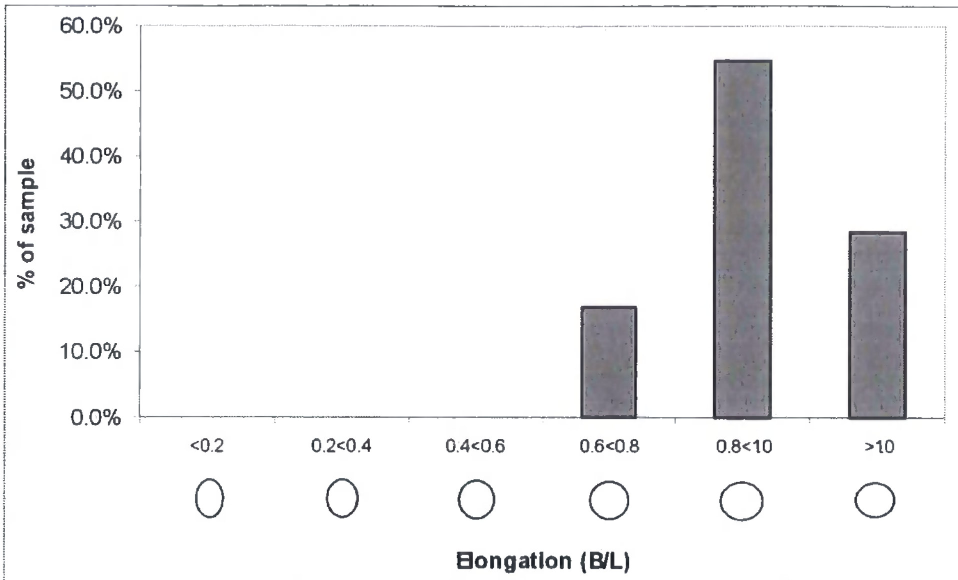

Figure 6.3.3 *Elongation of Levallois cores from Tulul Defai (n=77).*

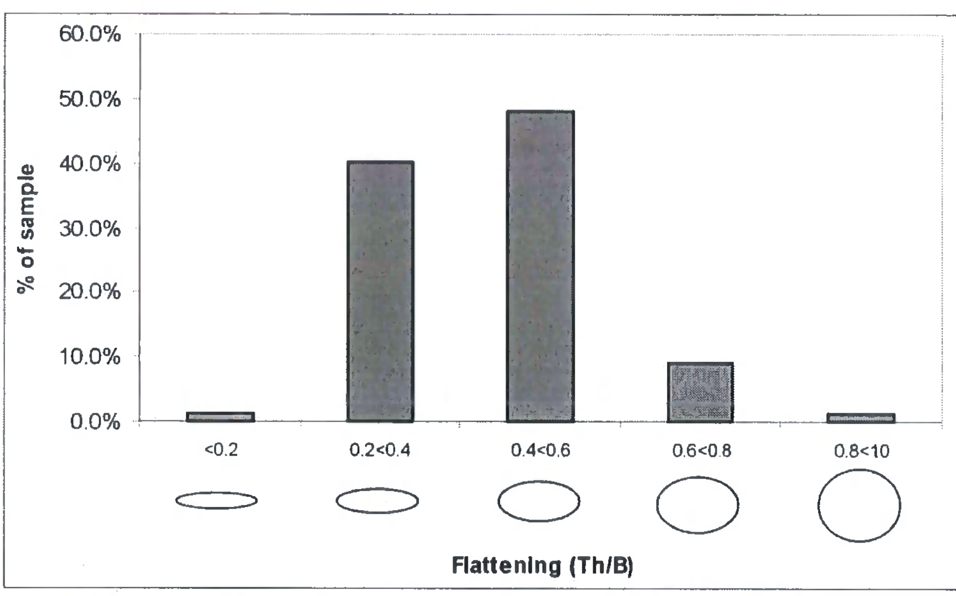

Figure 6.3.4 *Flattening of Levallois cores from Tulul Defai (n=77).*

There is some indication that a notable number of the Levallois cores from Tulul Defai were originally significantly larger than they are now. This is demonstrated by the fact that their striking platform surfaces are flat to gently curved (personal observation), retain high amounts of cortex, and many exhibit remnants of the distal ends of large flake scars (see table 6.3.7). Significantly, 20.8% of Levallois cores retain scars on the flaking surfaces that indicate re-preparation following an earlier exploitation phase, but are unexploited (19.5%), or display evidence that the final removal failed to detach successfully (14.3%). Flakes are the product which appears to have been most commonly removed from the final flaking surface (61.0%).

Levallois cores; technological observations (n=77)						
Preparation method (n=77)			Exploitation method (n=77)			
Unipolar	3	3.9%	*Unexploited*	2	2.6%	
Bipolar	7	9.1%	*Lineal*	39	50.6%	
Convergent unipolar	4	5.2%	*Unipolar recurrent*	5	6.5%	
Centripetal	60	77.9%	*Bipolar recurrent*	2	2.6%	
Bipolar lateral	1	1.3%	*Centripetal recurrent*	3	3.9%	
Obscured	2	2.6%	*Re-prepared but unexploited*	15	19.5%	
			Failed final removal	11	14.3%	
Preparatory scars on flaking surface (n=77)			Preparatory scars on striking platform (n=77)			
1-5	45	58.4%	1-5	30	39.0%	
6-10	27	35.1%	6-10	39	50.6%	
11-15	5	6.5%	11-15	6	7.8%	
>15	0	0.0%	>15	2	2.6%	
Position of cortex on striking platform (n=77)			Percentage cortex on striking surface (n=77)			
None	4	5.2%	0	4	5.2%	
One edge only	14	18.2%	>0-25%	14	18.2%	
More than one edge	2	2.6%	>25-50%	16	20.8%	
All over	32	41.6%	>50-75%	27	35.1%	
Central	4	5.2%	>75%	16	20.8%	
Central and one edge	20	26.0%				
Central and more than one edge	1	1.3%				
Levallois products from flaking surface (n=77)			Type of products from flaking surface (n=77)			
0	16	20.8%	*Unexploited*	17	22.1%	
1	48	62.3%	*Flake*	47	61.0%	
2	9	11.7%	*Overshot*	2	2.6%	
3	3	3.9%	*Failed removal*	11	14.3%	
Earlier flaking surface (n=77)						
Yes	16	20.8%				
No	61	79.2%				
			Dimension of final Levallois products (n=60)			
Remnant distals on striking platform (n=77)			*Min Length*	30.0	*Min Breadth*	23.0
Yes	16	20.8%	*Max Length*	81.0	*Max Breadth*	66.0
No	61	79.2%	*Mean Length*	51.2	*Mean Breadth*	42.2

Table 6.3.7 Technological observations for Levallois cores from Tulul Defai.

Most of the Levallois cores analysed (77.9%) display evidence of centripetal preparation, the convexities necessary for Levallois flaking being created through continuous working of the whole surface. This may be significant, as a number of studies suggest that centripetal preparatory strategies are common towards the end of Levallois reduction sequences (e.g. Dibble 1995, Meignen 1995). Examples of Levallois cores prepared using bipolar (9.1%), convergent unipolar (5.2%), unipolar (3.9%) and bipolar lateral (1.3%) preparatory techniques were also encountered in small numbers at Tulul Defai. Approximately half of the cores reflect the removal of only a single flake from the final flaking surface (lineal exploitation = 50.6%). Examples of recurrent techniques, including unipolar (6.5%), centripetal (3.9%) and bipolar recurrent exploitation (2.6%), were also noted. The cores discarded at Tulul Defai, like those studied from Tahoun Semaan 2 and 3 (see section 6.2), appear to reflect the maximisation of production from individual Levallois flaking surfaces, either through cyclical re-preparation, or recurrent exploitation.

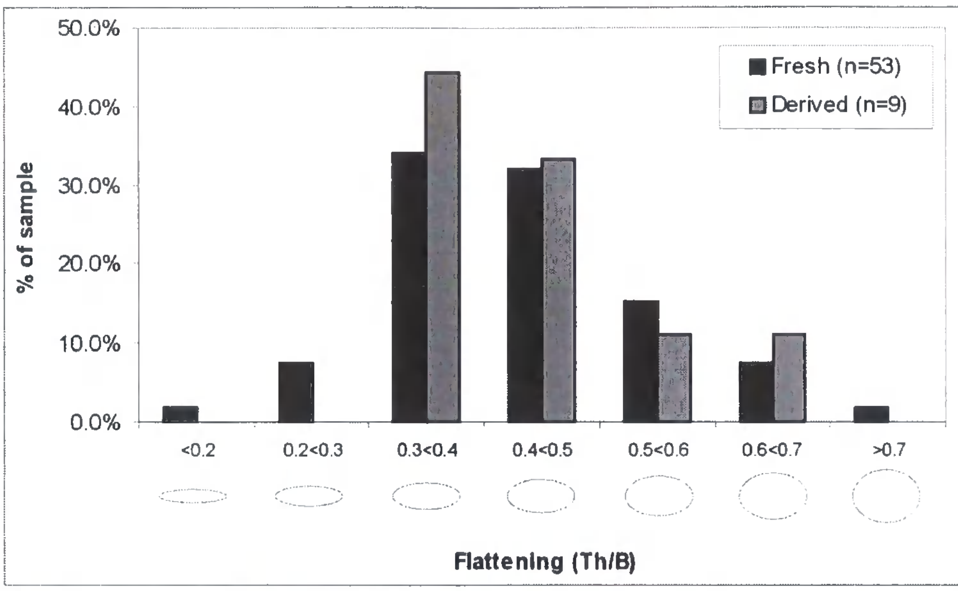

Figure 6.3.5 Flattening of Levallois cores from Tulul Defai illustrated according to source of raw material used (n=61; examples on blanks lacking evidence of the source of the raw material exploited are excluded).

The majority of the Levallois cores from Tulul Defai (80.5%) retain cortex on the striking platform surface, enabling identification of the raw material source (see table 6.3.5). In most cases (68.8%) the blanks used originate from a primary source of chert/flint, such as that available at the site. In addition, a significant number (11.7%) retain water-worn cortex indicative of the working of chert/flint clasts from fluvial contexts; such clasts do not appear to have been obtainable in the immediate vicinity of the Tulul Defai, but may have been available in the valley below. In many ways, the Levallois core assemblage shares features with that from Tahoun Semaan 2 and 3; however, one significant difference is also apparent. Whereas at Tahoun Semaan 2 and 3 cores produced on material not immediately available at the site are noticeable flatter, and therefore more reduced, than those produced on blanks from the immediate vicinity, this is not the case at Tulul Defai. Here, Levallois cores produced on fresh and rolled nodules are equally flat, and hence have been worked to the same degree (see figure 6.3.5). However, both locales represent points in the landscape at which raw material was available, and where Levallois cores brought in from elsewhere were discarded.

Simple Prepared Cores

Nineteen simple prepared cores were identified amongst the extant artefacts from Tulul Defai. In terms of morphology, such cores closely resemble the Levallois cores from the site, being small (see table 6.3.8) and round in planform (see figure 6.3.6). In general, however, it appears that the simple prepared cores discarded at Tulul Defai had greater reductive potential. Although some were fairly thin when discarded, indicating that they had been extensively reduced, further reduction of the majority was clearly possible (see figure 6.3.7). One potential reason why they were not further reduced is the fact that the final removals from the flaking surfaces of the simple prepared cores are comparable in size to those detached from the Levallois cores (see tables 6.3.7 and 6.3.9). Consequently, any further flakes produced would be noticeably smaller than those which were removed from the final flaking surface of the Levallois cores found at the locale.

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	65.7	63.4	29.3	127.5	0.98	0.46
Median	70.0	58.5	29.0	124.0	1.01	0.48
Min	45.9	48.0	17.6	47.0	0.69	0.30
Max	82.5	87.0	45.3	246.0	1.40	0.58
St.Dev.	11.5	11.2	8.1	56.4	0.19	0.09

Table 6.3.8 Tulul Defai simple prepared cores summary statistics (n=19).

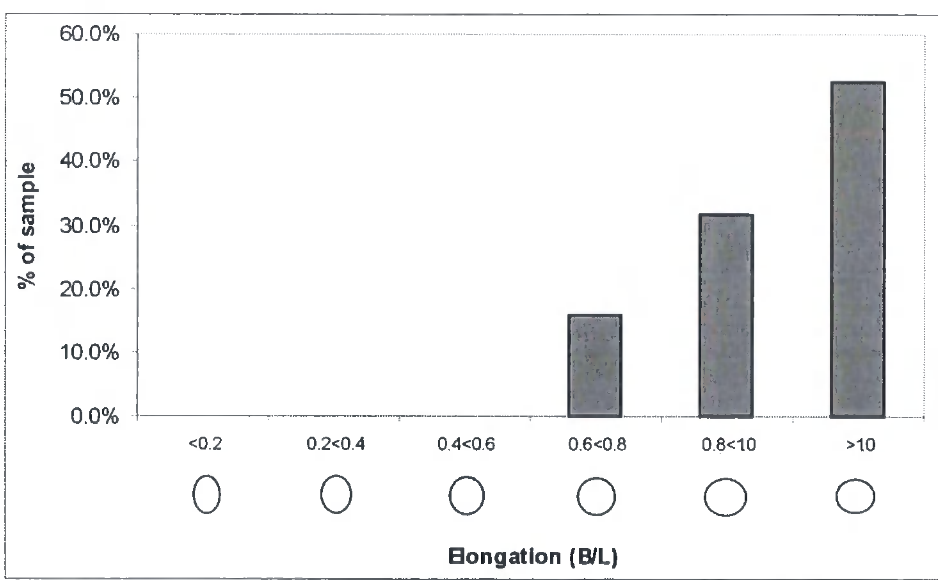

Figure 6.3.6 Elongation of simple prepared cores from Tulul Defai (n=19).

Just under half of the simple prepared cores from Tulul Defai reflect the removal of only a single flake from the final flaking surface (lineal exploitation = 42.1%). However, examples of exploitation through recurrent techniques, in particular unipolar (21.1%) and bipolar modalities (15.8%), were also frequently noted (table 6.3.9). Unlike the Levallois cores, none of the simple prepared cores from the site exhibit the distal remnants of flake scars on the striking platform surface, suggesting that the selected blanks were not much larger than the cores themselves when discarded. This is reinforced by the fact that blank form can be determined for nearly half of the simple prepared cores (see table 6.3.5), the majority being produced on nodules (21.1%) and naturally shattered blocks (15.8%). This suggests that the simple prepared cores from Tulul Defai represent the exploitation of small nodules which fortuitously possessed the convexities necessary for the removal of medium-sized flat flakes.

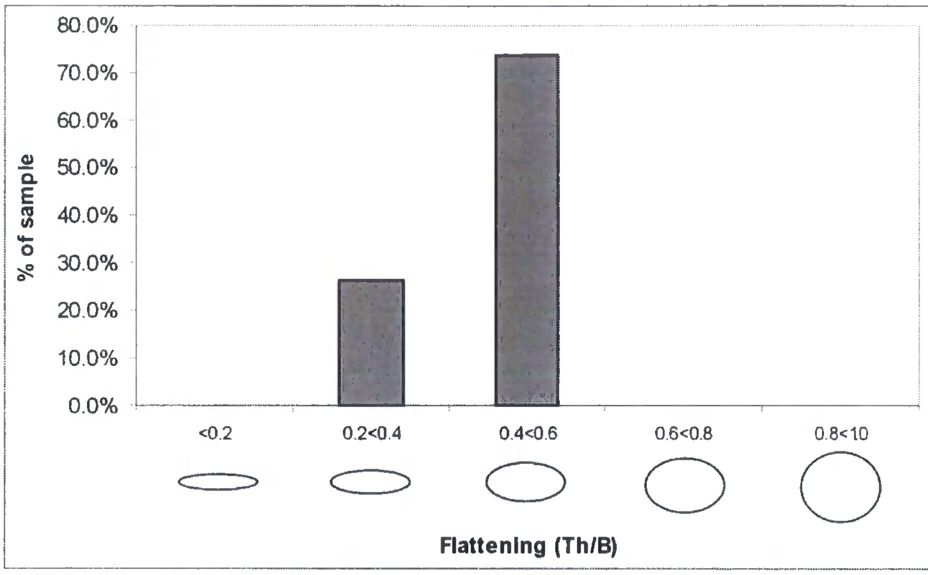

Figure 6.3.7 *Flattening of simple prepared cores from Tulul Defai (n=19).*

Simple prepares cores; technological observations (n=19)

Exploitation method (n=19)			Preparatory scars on striking platform (n=19)		
Lineal	8	42.1%	1-5	10	52.6%
Unipolar recurrent	4	21.1%	6-10	9	47.4%
Bipolar recurrent	3	15.8%	11-15	0	0.0%
Centripetal recurrent	1	5.3%			
Re-prepared but unexploited	1	5.3%			
Failed final removal	2	10.5%			
Percentage cortex on striking surface (n=19)			Position of cortex on striking platform (n=19)		
0	2	10.5%	*None*	2	10.5%
>0-25%	1	5.3%	*One edge only*	2	10.5%
>25-50%	1	5.3%	*More than one edge*	0	0.0%
>50-75%	8	42.1%	*All over*	11	57.9%
>75%	7	36.8%	*Central*	1	5.3%
			Central and one edge	3	15.8%

Products from final flaking surface (n=19)			Dimension of final Levallois products				
0	1	5.3%	*Min Length*	29.5	*Min Breadth*	29.0
1	10	52.6%	*Max Length*	74.1	*Max Breadth*	59.5
2	6	31.6%	*Mean Length*	49.8	*Mean Breadth*	41.1
3	1	5.3%				
4	1	5.3%	Remnant distals on striking platform (n=19)			
			Yes		0	0.0%
			No		19	100 %

Table 6.3.9 *Technological observations for simple prepared cores from Tulul Defai.*

Levallois Products

Only two definite Levallois products were identified amongst the artefacts from Tulul Defai, one a flake and the other a proximal fragment (table 6.3.10). Both are the result of centripetal preparation of the flaking surface of the core from which they were detached, and can be classed as lineal removals that do not retain any evidence of previous Levallois flake scars.

	Type	Portion	Butt	Prep. scars	Prep. method	Exploit. method	Length (mm)	Breadth (mm)	Thick. (mm)	Elong. (B/L)
1	Ind.	Prox.	Facett.	5	Centripet.	Lineal	32.3	28.3	66.3	n/a
2	Flake	Whole	Plain	8	Centripet.	Lineal	83.0	54.0	19.0	0.65

Table 6.3.10 Summary statistics and technological observations for definite Levallois products from Tulul Defai.

Non-Levallois Cores

	No. of artefacts	% of total
Migrating platform cores	104	60.5%
Single platform unprepared	8	4.7%
Opposed platform unprepared	2	1.2%
Discoidal	47	27.3%
Fragment	11	6.4%
Total	172	100%

Table 6.3.11 Non-Levallois core forms from Tulul Defai.

Over half (60.5%) of the non-Levallois cores studied from Tulul Defai are migrating platform cores which do not result from a specific volumetric approach to core reduction, but rather the *ad hoc* exploitation of particular platforms as they became available throughout reduction (table 6.3.11). However, a significant number of discoidal cores (27.3%), resulting from alternate/alternating flaking from a single, peripheral platform into the volume of two non-hierarchically related surfaces (Boëda 1995), were also noted. The reduction of both types almost exclusively involved a nodular blank (migrating platform = 20.2%, discoidal =10.6%), or a fractured block (migrating platform = 21.2%, discoidal = 12.8%; table 6.3.5) and, although a small number (migrating platform = 2.9%, discoidal = 4.3%) possess water worn cortex indicating that the raw material used could not have been obtained at the Tulul Defai findspot, the majority (migrating platform = 74.0%, discoidal = 61.7%) were produced using fresh chert/flint, which was immediately available at the site (table 6.3.5).

The migrating platform cores from Tulul Defai tend to be a similar size to the Levallois and simple prepared cores from the locale (see tables 6.3.6 and 6.3.12); however, they also tend to be heavier. This probably reflects the globular profile of the migrating platform cores, in contrast to the lenticular outline of the Levallois and simple prepared cores. Interestingly, the discoidal cores tend to be of a similar size *and* weight to Levallois and simple prepared cores, which probably relates to the fact that they tend to be relatively flat and present a similar profile (personal observation). This is significant as it has been argued that in some instances discoidal core working represents the final expression of centripetal recurrent exploitation of a Levallois core (Baumler 1988, Meignen and Bar Yosef 1991, Baumler and Speth 1993, Hovers 1998).

	Migrating platform cores (n=104)		Discoidal cores (n=47)	
	Maximum dimensions (mm)	Weight (grams)	Maximum dimensions (mm)	Weight (grams)
Mean	71.3	150.6	67.0	126.1
Median	65.9	130.0	64.9	113.0
Min	45.2	31.0	45.9	43.0
Max	111.0	563.0	100.0	447.0
St.Dev.	13.7	83.8	11.2	66.9

Table 6.3.12 Summary statistics for migrating platform and discoidal cores from Tulul Defai.

Migrating platform cores; technological observations (n=104)					
Core episodes (n=356)			Flake scars/core (n=104)		
Type A: Single Removal	56	15.7%	1-5	19	18.3%
Type B: Parallel flaking	59	16.6%	6-10	43	41.3%
Type C: Alternate flaking	140	39.3%	11-15	31	29.8%
Type D: Unattributed removal	101	28.4%	>15	11	10.6%
			Max	20	-
			Mean	9.5	-
Core episodes/core			Flake scars/core episode		
Min	1	-	*Min*	1	-
Max	13	-	*Max*	13	-
Mean	3.2	-	*Mean*	3	-
% Cortex (n=104)			Blank form retained? (n=104)		
0	17	16.3%	*Yes*	24	23.1%
>0-25%	32	30.8%	*No*	80	76.9%
>25-50%	46	44.2%			
>50-75%	7	6.7%			
>75%	2	1.9%			

Table 6.3.13 Technological observations for migrating platform cores from Tulul Defai.

Reduction of the migrating platform cores from Tulul Defai (table 6.3.13) appears to have been reasonably intensive, with an average of 9.5 flake scars per core, but does not seem to have been excessively prolonged. The average number of episodes per migrating platform core from Tulul Defai is limited to 3.2, while the average core episode involved just 3.6 removals. In addition, cortex retention on the migrating platform cores is relatively high with 83.7% possessing some cortex, and just over half (52.8%) displaying cortex on more than 25% of their surface area. Nearly a quarter (23.1%) retain their original blank form.

In comparison to the migrating platform cores, the discoidal cores from Tulul Defai (table 6.3.14) appear to have been more intensively flaked, with an average of 13.0 flake scars per core. In addition, although the mean number of episodes is less (2.4 per core), individual episodes of flaking of the discoidal cores were longer, involving an average of 5.4 removals. This increased reduction intensity is reflected in the fact that almost a quarter of the discoidal cores (23.9%) retain no cortex, while only 37.0% display cortex on more than 25% of their surface area. As a result of the relative low levels of cortex retention, only 12.8% retain their original blank form. The fact that the discoidal cores from Tulul Defai are the product of intensive reduction supports the suggestion that they represent the final stages of prolonged exploitation of Levallois cores. If this is the case, the presence of a significant number of discoidal cores strengthens the impression gained that much of the Levallois core assemblage from Tulul Defai represents material discarded following intensive exploitation.

Discoidal cores; technological observations (n=47)					
Core episodes (n=113)			Flake scars/core (n=47)		
Type A: Single Removal	6	5.3%	1-5	0	0.0%
Type B: Parallel flaking	4	3.5%	6-10	15	31.9%
Type C: Alternate flaking	62	54.9%	11-15	17	36.2%
Type D: Unattributed removal	41	36.3%	>15	15	31.9%
			Max	23	-
			Mean	13.0	-
Core episodes/core			Flake scars/core episode		
Min	1	-	*Min*	1	-
Max	8	-	*Max*	20	-
Mean	2.4	-	*Mean*	5.4	-
% Cortex (n=47)			Blank form retained? (n=47)		
0	11	23.9%	*Yes*	6	12.8%
>0-25%	18	39.1%	*No*	41	87.2%
>25-50%	16	34.8%			
>50-75%	1	2.2%			
>75%	0	0.0%			

Table 6.3.14 Technological observations for discoidal cores from Tulul Defai.

Handaxes

	Length (mm)	**Breadth (mm)**	**Thickness (mm)**
Mean	81.4	66.2	35.0
Median	80.0	65.5	34.6
Min	59.3	49.7	22.0
Max	98.4	87.0	52.0
St.Dev.	13.8	12.9	8.9

Table 6.3.15 Tulul Defai handaxe summary statistics (n=8, fragments excluded).

In total 16 whole handaxes and 37 handaxe fragments were studied from Tulul Defai. Not only are there many handaxe fragments, but all were broken in the distant past, since their break surfaces are patinated to the same extent as the rest of the artefacts. Furthermore, 8 of the 16 complete artefacts are unfinished roughouts. Thus, 84.9% of the bifacially worked artefacts from Tulul Defai represent implements broken during manufacture/use, or material abandoned during production. In addition to implying that handaxes were made at Tulul Defai, this data may also suggest that finished handaxes were transported away from the site. It is also significant that, although most handaxes and handaxe fragments retain cortex reflecting the use of immediately available fresh chert/flint (45.3%), a small number display water-worn cortex (11.3%; table 6.3.5). As no source of fluvially derived material has been noted at Tulul Defai, this suggests that at least some complete handaxes, or the blanks from which they were manufactured, were bought into the site from elsewhere. It therefore seems that the transport of handaxes is evident at Tulul Defai; a number of those present were imported from elsewhere, whilst the apparent lack of complete handaxes is arguably a reflection of their subsequent transport.

Handaxes; technological observations (n=53)					
Portion (n=53)			Hammer mode (n=53)		
Whole	8	15.1%	*Hard*	38	71.7%
Roughout	8	15.1%	*Soft*	3	5.7%
Tip	6	11.3%	*Mixed*	11	20.8%
Butt	19	35.8%	*Indeterminate*	1	1.9%
Fragment	12	22.6%			
Cortex retention (n=8)			Cortex position (n=8)		
0	4	50.0%	*None*	4	50.0%
>0-25%	4	50.0%	*Butt only*	2	25.0%
>25-50%	0	0.0%	*Butt and edges*	0	0.0%
>50-75%	0	0.0%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	1	12.5%
			All over	1	12.5%
Evidence of blank dimensions? (n=8)			Edge Position (n=8)		
No	6	75.0%	*All round*	6	75.0%
1 dimension	1	12.5%	*All edges sharp, dull butt*	2	25.0%
2 dimension	1	12.5%	*Most edges sharp, dull butt*	0	0.0%
			One sharp edge, dull butt	0	0.0%
Butt working (n=8)			Length of cutting edge in mm (n=8)		
Unworked	0	0.0%	*Min*	20	-
Partially worked	2	25.0%	*Max*	24	-
Fully worked	6	75.0%	*Mean*	22.0	-
Scar Count (n=8)					
Min	15	-			
Max	27	-			
Mean	22	-			

Table 6.3.16 Technological observations for handaxes from Tulul Defai.

Such finished handaxes as are present in the Tulul Defai collection tend to be small, pointed ovates (table 6.3.15, figure 6.3.8) worked using a hard hammer (table 6.3.16). The fact that they display high scar counts and lows levels of cortex (see table 6.3.16) indicates they have been subject to moderately intense reduction, which is in turn reflected by their moderate levels of refinement (figure 6.3.9). Interestingly, although no complete handaxes in the collection display evidence of soft hammer working, a number of fragments do, especially broken tip fragments (see figure 6.3.10). Given the apparent evidence of handaxe transport in and out of the site, this seems to reflect complete soft hammer handaxes being transported away to be used elsewhere, whilst those which broke during manufacture were left behind. It is tempting to speculate that the over-representation of broken handaxe butts in comparison to tips (see table 6.3.16) might reflect the reworking of tips into usable bifacial forms; equally, they may be under-represented in this surface collection, being more prone to breakage.

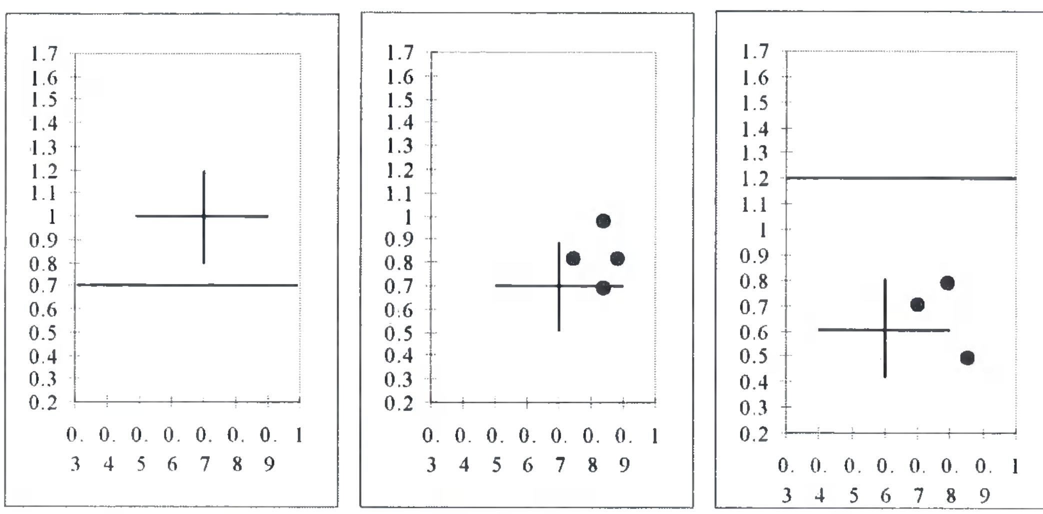

Figure 6.3.8 Tripartite diagrams for complete handaxes from Tulul Defai (n=7; one complete handaxe is too heavily abraded and edge damaged to allow for all the required measurements to be accurately taken).

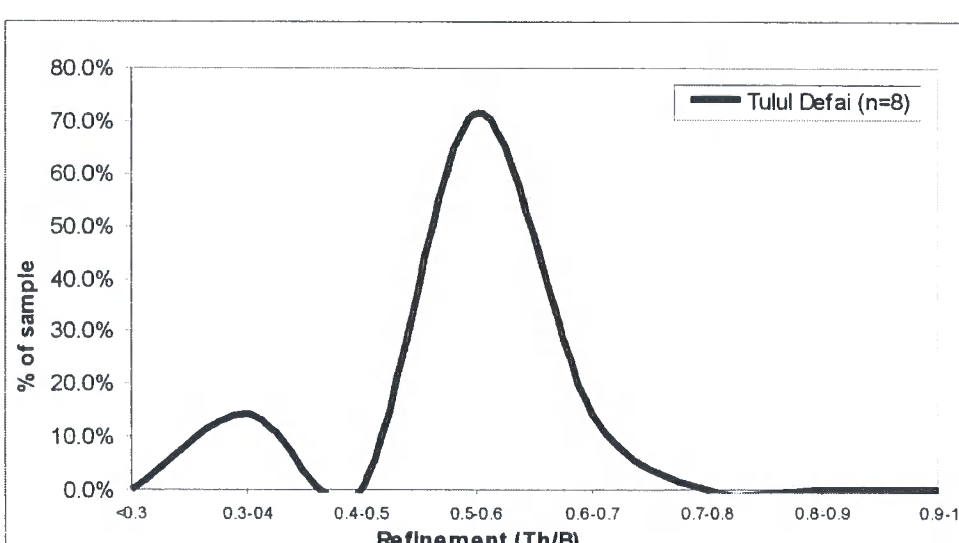

Figure 6.3.9 Levels of refinement for complete handaxes from Tulul Defai.

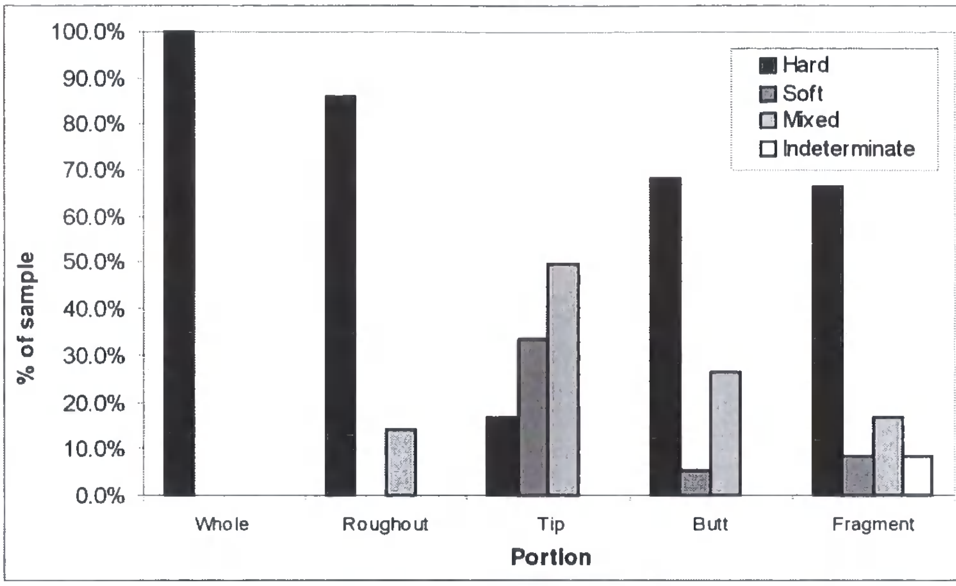

Figure 6.3.10 Hammer mode used in production of handaxes, roughouts and handaxe fragments from Tulul Defai.

Non-Levallois Flakes

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	61.4	49.4	18.7
Median	59.7	48.0	18.2
Min	19.3	14.8	6.8
Max	104.2	100.0	45.1
St.Dev.	17.5	14.3	5.9

Table 6.3.17 Tulul Defai non-Levallois flakes summary statistics (n=201, fragments excluded).

The non-Levallois flakes analysed from Tulul Defai tend to be medium-sized (see table 6.3.17) and produced using a hard hammer (see table 6.3.18). They generally display moderate numbers of dorsal scars, with 41.6% possessing three or more flake scars on their dorsal surface, while multi-directional (44.8%) and unidirectional (35.0%) scar patterns dominate (table 6.3.18). These observations could be reflective of either handaxe production or Levallois flaking. The vast majority (94.9%) of the flakes which retain cortex were produced on immediately available fresh chert/flint. Notably, comparison between the distribution of cortex retention on the non-Levallois flake assemblage from Tulul Defai with Ashton's (1998b) experimental data for cortex retention on flakes produced during core and handaxe reduction has produced an excellent correlation between the archaeological and experimental datasets (figure 6.3.11). This suggests that the flakes recovered from Tulul Defai are representative of complete knapping sequences.

Non-Levallois flakes; technological observations (n=257)					
Portion (n=257)			Dorsal scars (n=201)		
Whole	201	78.2%	0	32	15.9%
Proximal	15	5.8%	1	40	19.9%
Distal	23	8.9%	2	46	22.9%
Mesial	8	3.1%	3	40	19.9%
Siret	10	3.9%	4	23	11.4%
			5	12	6.0%
			>5	7	3.5%
			Obscured	1	0.5%
Dorsal cortex retention (n=201)			Dorsal scar pattern (n=201)		
100%	32	15.9%	*Uni-directional*	71	35.3%
>50%	38	18.9%	*Bi-directional*	8	4.0%
<50%	98	48.8%	*Multi-directional*	89	44.3%
0%	32	15.9%	*Wholly cortical*	30	14.9%
Obscured	1	0.5%	*Janus flake*	2	1.0%
			Obscured	1	0.5%
Butt type (n=257)			Hammer mode (n=257)		
Plain	106	41.2%	*Hard*	248	96.5%
Dihedral	3	1.2%	*Soft*	2	0.8%
Cortical	25	9.7%	*Indeterminate*	7	2.7%
Natural (but non-cortical)	17	6.6%			
Marginal	10	3.9%	Relict core edge(s) (n=201)		
Mixed	3	1.2%	*Yes*	54	26.9
Soft hammer	2	0.8%	*No*	146	72.6
Obscured	33	12.8%	*Obscured*	1	0.5
Missing	58	22.6%			

Table 6.3.18 Technological observations for non-Levallois flakes from Tulul Defai.

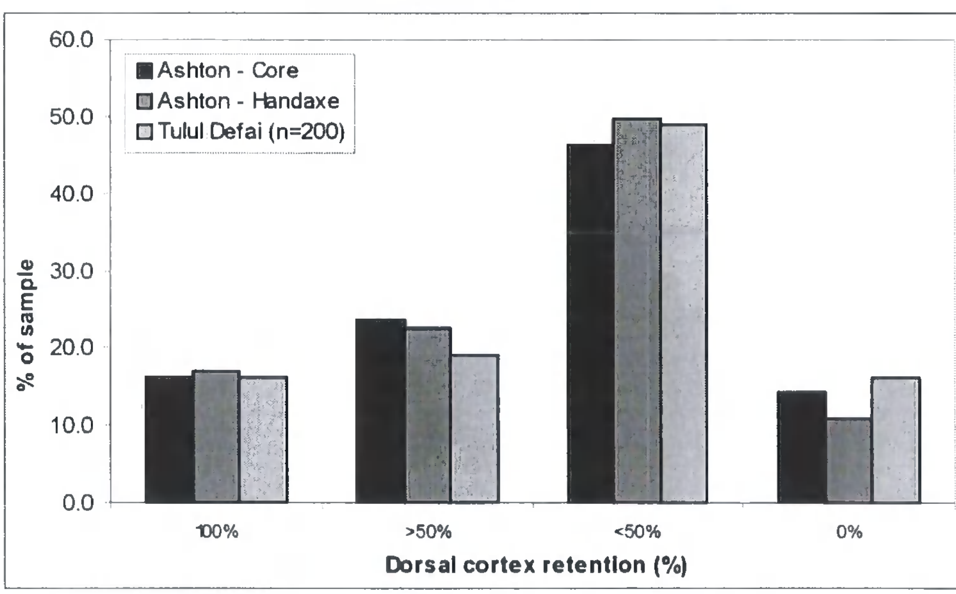

Figure 6.3.11 Comparison of percentage dorsal cortex rentention on non-Levallois flakes from Tulul Defai, and experimental data generated by Ashton (1998b) for core and handaxe reduction.

Retouched Tools

Eight retouched artefacts were identified in the Tulul Defai collection studied. Six are on non-Levallois flakes, while the other two consist of a retouched thermal flake and a core which has subsequently had one edge modified to form a scraper. The nature and position of the retouch on these artefacts is presented in table 6.3.19.

Nature of retouch on modified flakes (n=8)			
Position		Location	
Direct	6	*Proximal*	3
Alternate	1	*Distal*	2
Bifacial	1	*One lateral edge*	2
		Continuous, except butt	1
Distribution		Edge form	
Continuous	6	*Convex*	7
Discontinuous	1	*Concave*	1
Partial	1		
Extent of retouch		Angle of retouched edge	
Minimally invasive	3	*Abrupt*	2
Semi-Invasive	4	*Semi abrupt*	6
Invasive	1		
Regularity of retouched edge		Morphology of retouch	
Regular	3	*Scaly*	8
Irregular	5		

Table 6.3.19 Nature of retouch on modified flakes from Tulul Defai.

Technology and Hominin Behaviour

In contrast to the other sites discussed in this thesis, Tulul Defai is not associated with Pleistocene fluvial deposits. Rather, it is located on a plateau edge overlooking the Orontes Valley and produced artefacts from a thin soil directly overlying bedrock. Technologically the material is regarded here as Middle Palaeolithic in character and is treated as a time-averaged palimpsest, reflecting ongoing technological practices at the site itself, as well as practices undertaken away from the site in the surrounding landscape.

The material shares many similarities with the assemblages from Tahoun Semaan 2 and 3, being dominated by three primary technological strategies; Levallois flaking, handaxe production and casual core working. As such, the patterns apparent at the site - as at other Middle Palaeolithic locales discussed here - reflect a wider range of variability than is discernable at any of the Lower Palaeolithic sites examined. Moreover, the nature of the assemblage also indicates a complex relationship between the site and its landscape setting. Whilst fresh raw material was immediately available from the chalk/limestone bedrock underlying the site, some artefacts of all classes were clearly imported from elsewhere - potentially from the valley floor overlooked by the site. This is particularly true of the Levallois cores and handaxes.

A proportion of the Levallois cores from the site are produced on fluvially derived clasts, such as might be obtained from gravels exposed in the valley bottom. Many such cores are also near-exhausted (frequently retaining evidence of failed final removals, or having been re-prepared but are unexploited) suggesting that they have been extensively curated and discarded at the site following exploitation in the wider landscape. The elevated proportion of small discoidal cores from the site may also reflect the intense curation/reduction of centripetal recurrent Levallois cores. Notably, very few Levallois flakes are present within the collection studied implying that exploitation predominately took place off-site.

In contrast to the Levallois cores, the non-Levallois flake data suggests that other artefacts were extensively worked on-site at Tulul Defai, as complete knapping sequences seem to be present. It is notable that the non-Levallois cores from the site are predominantly produced on raw material which was immediately available, and their working was not overly intensive or deliberately prolonged (in contrast to the Levallois cores), suggesting that every stage of the *chaîne opératoire* - from blank selection to discard - was undertaken in this locale. The simple prepared cores from the site are also likely to have been fully worked there; these cores reflect the exploitation of small nodules which fortuitously possessed the convexities necessary for the removal of medium-sized flat flakes, but which were not deliberately prepared/re-prepared. Had such actions been undertaken to prolong their productive life, they would effectively have become "true" Levallois cores - though only capable of producing very small flakes.

The handaxes from Tulul Defai also allow insights into the relationship of the site and its wider landscape setting. The vast majority are fragments displaying ancient breaks suggestive of manufacture at the site. Notably, although some fragments, particularly tips, reflect the use of a soft hammer, none of the few whole handaxes have been thinned in such a way; it seems likely that handaxes were produced at the site and carried away for use elsewhere.

Several aspects of the Tulul Defai assemblage therefore allow inferences to be made concerning the relationship between actions undertaken at the site itself, and activity undertaken in the surrounding landscape. Different artefact classes seem to have been treated in different ways - handaxes were manufactured at the site, but exported for use elsewhere, exhausted Levallois cores were discarded at the site which were probably initially prepared and used in the valley below. Conversely, complete reduction sequences were also undertaken. Tulul Defai appears to represent a situation in which hominins were able to monitor the valley below whilst also undertaking toolkit maintenance tasks (e.g. handaxe manufacture), moving on from the site again equipped to deal with future contingencies. The exact nature of the tasks undertaken at the site is harder to evaluate, given the palimpsest nature of the occurrence, but, like that from Tahoun Semaan 2 and 3, the assemblage does reflect increasingly varied patterning in terms of landscape-use and technological organisation during the Middle Palaeolithic.

6.4 Latamne Quarry 1 "Red colluvium"

Location & History of Investigation

The Orontes river gravels found around the village of Latamne are famous for having produced a minimally disturbed Middle Pleistocene artefact assemblage (see chapter five, section 5.4). However, during the course of the 1961/1962 and 1964 excavations which recovered this material, stone tools, including a number of Levallois cores, were also collected from colluvial deposits capping truncated fluvial gravels located in a pit ~1.5 km south of the Latamne village (see figure 6.4.1). This is the same location (Quarry 1) which in 1960 produced the first faunal remains and stone tools found at the site (Van Liere 1960).

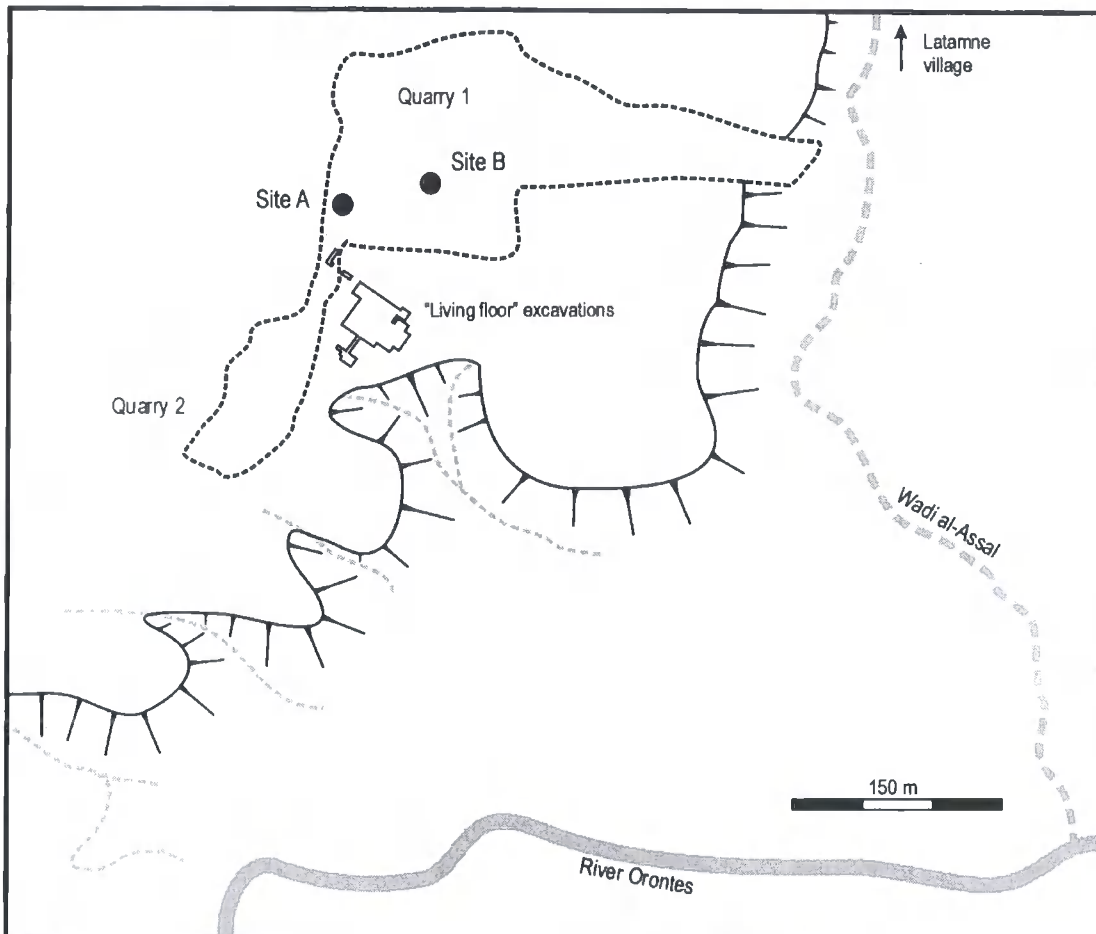

Figure 6.4.1 Location map illustrating position of Latamne Quarry 1, and sites A and B.

Little is known about the recovery of the 1961/1962 material save that at least two Levallois cores (subsequently illustrated in Clark 1966a; 1967 figure 1) were collected from Quarry 1 (Clark 1966a, 37; 1967, 8). These are now located in the National Museum, Damascus and, along with a number of other artefacts, are labelled "L/R/S", which presumably refers to their origin - "Latamne Red Soil." Much more is known about the material recovered in 1964. These artefacts were collected by J. D. Clark from two locations (Site A and Site B) in the western and northern end of Quarry 1 (Clark 1966a, 35; 1967, 8; see figure 6.4.1). In addition to the stone tools, several limb bones, tentatively assigned to *Equus* sp., and including some articulated examples, were found at Site B (Clark 1966a, 33; 1967, 4). Subsequently, the 1977 CNRS survey (see section 4.2) recovered a further twelve artefacts from similar deposits found in the same quarry (Copeland and Hours 1993, 115).

Geological Background & Preferred Dating

The artefacts from Latamne Quarry 1 are associated with a red argillaceous, calcareous deposit, which shows clear signs of soil development (De Heinzelin 1966; 79; 1968, 16, Dodonov *et al.* 1993, 191, Besançon and Sanlaville 1993, 25). The deposit is up to 1.5 m thick and overlies (and in places fills pipes and hollows in) truncated fluvial gravels (De Heinzelin 1966, 79; 1968, 16). At least in the case of the 1964 material, the artefacts were concentrated towards the base of the colluvial deposit (Clark 1966a, 35; 1967, 8; see figure 6.4.2).

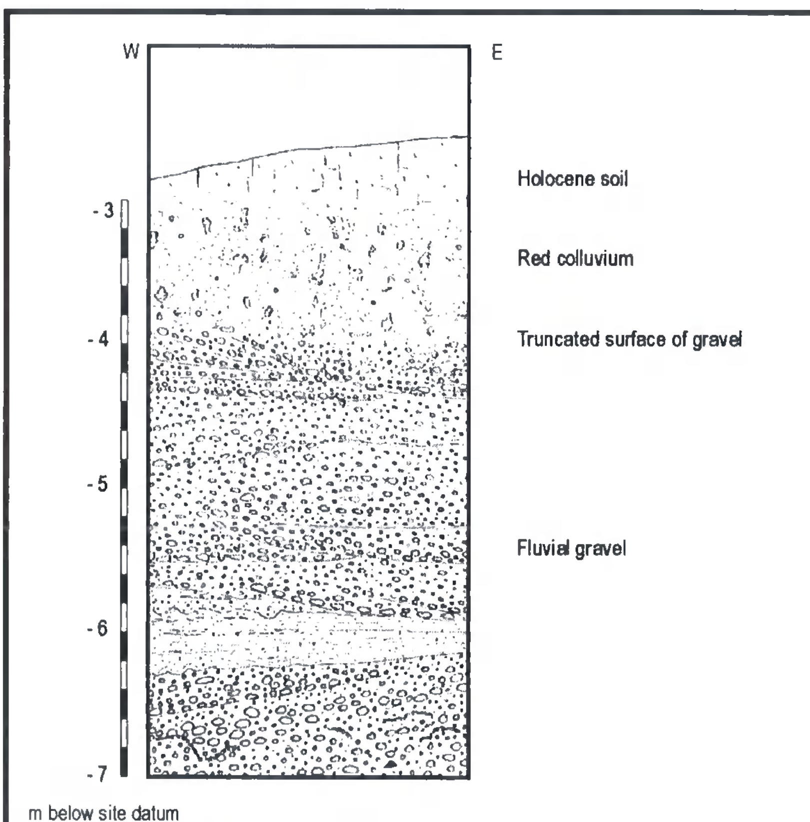

Figure 6.4.2 Section drawing of deposits located at the northern end of Latamne Quarry 1 (based on Clark 1966, figure 9; 1968, figure 9).

Unfortunately, no direct chronological information is available to date the formation of the colluvial deposits found in Quarry 1 at Latamne. It is clear that it accumulated following the emplacement of the underlying gravels, which, on the basis of their association with a mammalian fauna including *Mammuthus trogontherii*, *Megaloceros verticornis* and *Stephanorhinus hemitoechus*, are currently dated to MIS 12 (see chapter five, section 5.4 for further discussion). The fact that there is a clear depositional hiatus between the two deposits indicates that the lapse of time between their formation could potentially have been considerable, however, the exact time period involved is currently unknown.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	No. of artefacts	% of total
Levallois cores	4	4.3%
Simple prepared cores	0	0.0%
Non-Levallois cores	6	6.4%
Definite Levallois Flakes	0	0.0%
Probable Levallois flakes	0	0.0%
Possible Levallois flakes	0	0.0%
Handaxes	0	0.0%
Non-Levallois flakes	76	80.9%
Flake tools	8	8.5%
Total	94	100%

Table 6.4.1 Material analysed Latamne Quarry 1 "Red colluvium".

The present study has focussed on material collected during the course of the 1961/1962 and 1964 research programmes at Latamne Quarry 1 which is currently in the National Museum in Damascus. The 1961/1962 collection consists of four flakes and four cores which are all labelled "L/R/S", indicating that they were recovered from an unknown location within the "Latamne [Quarry 1] Red Soil." As has been noted, the 1964 collections were recovered from two locations; Site A located within colluvial material at the western end of the gravel quarry, and Site B found amongst similar deposits at the northern end of the pit (Clark 1966a, 35; 1967, 8). Unfortunately, it is no longer possible to assign the extant artefacts to a specific site within the quarry. However, the original artefact counts (Clark 1966a; 1967, Table 6) illustrate that, while approximately 88 artefacts were recovered at Site A, only around 9 were found at Site B (counts exclude "artefacts" described as chunks, as study of extant collection suggests little of this material is manufactured by humans). Consequently, it is safe to assume that the majority of the 1964 material analysed originated from Site A. Due to the small size of the 1961/1962 collection, the material studied has been considered here as part of a single assemblage comprising 94 artefacts (see table 6.4.1).

Taphonomy of lithic assemblage

None of the artefacts recovered from the red colluvium in Quarry 1 at Latamne display evidence of fluvial abrasion (tables 6.4.2 and 6.4.3). This suggests that, although many were recovered from the base of the colluvial deposits near the contact with the underlying fluvial gravels (Clark 1966a, 33; 1967, 8), they have not been subject to fluvial transport. In addition, the fact that relatively few artefacts (23.8%) exhibit edge damage, and none are scratched, suggests that the material was rapidly covered by the fine grained colluvial deposits before damage could be incurred through exposure on the surface. The taphonomic evidence, along with the stratigraphic observations provided by Clark (see above) points to the artefacts from the red colluvium in Quarry 1 at Latamne being deposited on the truncated surface of the fluvial gravels and rapidly sealed by fine grained colluvium.

Cores from Latamne Quarry 1 "Red colluvium" (n=10)					
Unabraded	10	100%	*No edge damage*	6	60.0%
Slightly abraded	0	0.0%	*Slight edge damage*	4	40.0%
Moderately abraded	0	0.0%	*Moderate edge damage*	0	0.0%
Heavily abraded	0	0.0%	*Heavy edge damage*	0	0.0%
Unstained	9	90.0%	*Unpatinated*	6	60.0%
Lightly stained	1	10.0%	*Lightly patinated*	4	40.0%
Moderately stained	0	0.0%	*Moderately patinated*	0	0.0%
Heavily stained	0	0.0%	*Heavily patinated*	0	0.0%
Unscratched	10	100%			
Lightly scratched	0	0.0%			
Moderately scratched	0	0.0%			
Heavily scratched	0	0.0%			

Table 6.4.2 Condition of cores from Latamne Quarry 1 "Red colluvium".

Flakes from Latamne Quarry 1 "Red colluvium" (n=84)					
Unabraded	84	100.0%	*No edge damage*	64	76.2%
Slightly abraded	0	0.0%	*Slight edge damage*	20	23.8%
Moderately abraded	0	0.0%	*Moderate edge damage*	0	0.0%
Heavily abraded	0	0.0%	*Heavy edge damage*	0	0.0%
Unstained	56	66.7%	*Unpatinated*	29	34.5%
Lightly stained	27	32.1%	*Lightly patinated*	55	65.5%
Moderately stained	1	1.2%	*Moderately patinated*	0	0.0%
Heavily stained	0	0.0%	*Heavily patinated*	0	0.0%
Unscratched	0	100%			
Lightly scratched	0	0.0%			
Moderately scratched	0	0.0%			
Heavily scratched	0	0.0%			

Table 6.4.3 Condition of flakes from Latamne Quarry 1 "Red colluvium".

As all but three of the flakes studied were recovered during the 1964 fieldwork, most of which were from a single locality (Site A; see above), it is possible to assess the degree of post-depositional disturbance the material from the site has undergone by comparing the maximum dimension of flakes collected during this research and Schick's (1986) data produced during experimental non-prepared core reduction (figure 6.4.3). A generally good correlation between the experimental and archaeological data can be observed, although the latter lacks flakes under 4 cm in maximum dimensions. This, however, is perhaps to be expected as the material from the site was collected, not systematically excavated (Clark 1966a, 37; 1967, 8). Consequently, the data arguably suggests that the material recovered from the red colluvium found in Latamne Quarry 1 represents *in situ* knapping debris, which was rapidly sealed by fine grained deposits after deposition.

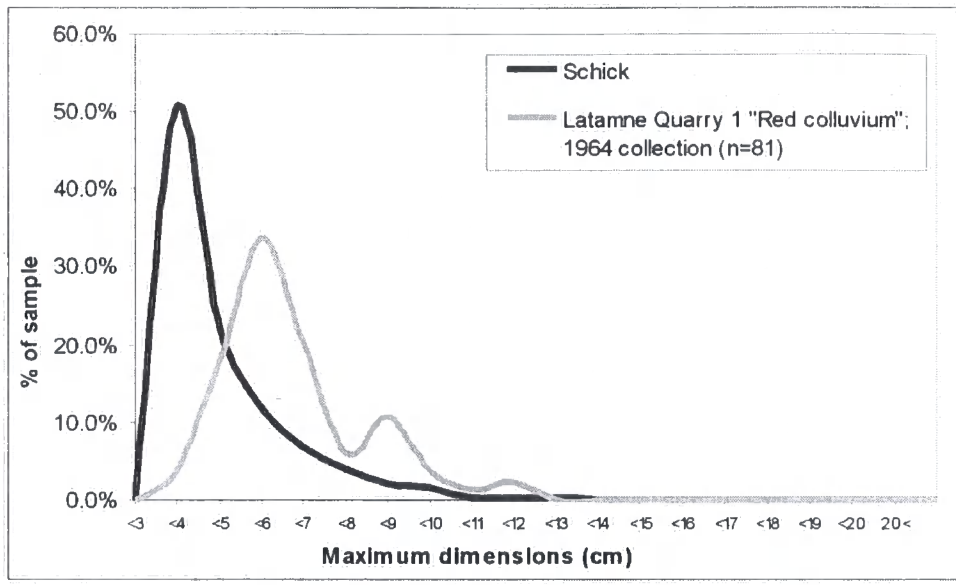

Figure 6.4.3 Comparison of maximum dimension of debitage larger than 2 cm recovered from Latamne Quarry 1 "Red colluvium" (1964 collection), and experimental data generated by Schick (1986).

Technology of lithic assemblage

Raw Material

	Levallois cores (n=4)	Non-Levallois cores (n=6)	Non-Levallois flakes (n=84)
Raw material			
Fresh	0.0%	0.0%	0.0%
Derived	75.0%	100%	8.3%
Indeterminate	25.0%	0.0%	16.7%
Blank form			
Nodule	25.0%	66.6%	-
Shattered Nodule	0.0%	0.0%	-
Flake	0.0%	0.0%	-
Thermal flake	0.0%	16.7%	-
Indeterminate	75.0%	16.7%	-

Table 6.4.4 Raw material and inferred blank form for artefacts studied from Latamne Quarry 1 "Red colluvium".

All the artefacts recovered from the red colluvium located in Quarry 1 at Latamne are produced on course grained chert/flint. All those which retain cortex on their surface attest to the use of fluvially derived raw material (see table 6.4.4), which would have been immediately available from the truncated river gravels on which the artefacts were deposited. Nearly half (40.0%; combined figure) of the cores do not retain enough evidence to assess the form of the original blanks (table 6.4.4). Nodules tend to have been preferentially exploited (50.0%), although one core was the product of working a thermal flake.

Levallois Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
AS 1	66.3	67.7	25.9	136.1	1.02	0.38
AS 2	102.5	83.0	29.4	269.0	0.81	0.35
AS 3	84.9	73.2	36.0	187.6	0.86	0.49

Table 6.4.5 Latamne Quarry 1 "Red colluvium" Levallois cores summary statistics.

Four Levallois cores were identified amongst the artefact collections studied from the red colluvium found in Latamne Quarry 1, one of which is partial. Of the complete cores, one (AS 1) is small, while the other two (AS 2 and AS 3) are medium-sized (see table 6.4.5). All are produced on fluvially derived chert/flint clasts, such as those immediately available at the site. The flaking surface of core AS 1 has been centripetally prepared, while that of AS 3 displays evidence of bipolar preparation; both retain scars indicative of single preferential flake removals. Core AS 2 has been centripetally prepared, but was discarded without any products being detached. This is interesting, as all three cores clearly possess the potential to be further reduced (Th/B=>0.4) and their size would suggest that this could have been achieved without producing significantly smaller products.

Simple Prepared Cores

No simple prepared cores were identified amongst the material from the red colluvium found in Latamne Quarry 1.

Levallois Products

No Levallois products were identified amongst the material from the red colluvium found in Latamne Quarry 1.

Non-Levallois Cores

Six non-Levallois cores were identified amongst the material studied from the Latamne red colluvium; five migrating platform and one single platform core. They tend to be medium-sized, although one large migrating platform core stands out (see table 6.4.6). Their low amounts of cortex retention, along with moderately high scar counts (see table 6.4.7), indicate that reduction of the non-Levallois cores from the site was reasonably intensive, but the fact that the average number of episodes per core is limited to 2.7, in addition to the observation that the average core episode involved just 3.8 removals, indicates that reduction was not prolonged. Despite cortex retention being generally low, all cores retain at least some. In each case this indicates that derived chert/flint clasts, such as those immediately available at the site, were utilised. In only one case can the form of the original blank (a nodule) be inferred.

	Maximum dimensions (mm)	Weight (grams)
Mean	69.7	215.3
Median	62.6	112.0
Min	41.2	23.0
Max	123.0	715.0
St.Dev.	28.4	257.2

Table 6.4.6 Latamne Quarry 1 "Red colluvium" non-Levallois cores summary statistics (n=6).

Non-Levallois cores; technological observations (n=6)					
Overall core reduction (n=6)			Core episodes (n=22)		
Migrating platform cores	5	83.3%	*Type A: Single Removal*	1	4.5%
Single platform unprepared	1	16.7%	*Type B: Parallel flaking*	1	4.5%
			Type C: Alternate flaking	9	40.9%
			Type D: Unattributed removal	11	50.0%
Flake scars/core (n=6)			Core episodes/core		
1-5	0	0.0%	*Min*	2	-
6-10	4	66.6%	*Max*	8	-
11-15	1	16.7%	*Mean*	3.8	-
>15	1	16.7%			
Max	17	-	Flake scars/core episode		
Mean	10.2	-	*Min*	1	-
			Max	6	-
% Cortex (n=11)			*Mean*	2.7	-
0	0	0.0%			
>0-25%	6	100.0%	Blank form retained? (n=11)		
>25-50%	0	0.0%	*Yes*	1	16.7%
>50-75%	0	0.0%	*No*	5	83.3%
>75%	0	0.0%			

Table 6.4.7 Technological observations for non-Levallois cores from Latamne Quarry 1 "Red colluvium".

Handaxes

No handaxes were identified amongst the material studied.

Non-Levallois Flakes

The non-Levallois flakes studied from the red colluvium found in Latamne Quarry 1 tend to be medium-sized (see table 6.4.8) and all were produced using a hard hammer (table 6.4.9). In order to assess whether the flake assemblage from the site is indicative of complete knapping sequences, comparison has been made between the distribution of cortex retention on the flakes with Ashton's (1998b) experimental data for core reduction (figure 6.4.4). There is a good correlation between the archaeological and experimental data in terms of the proportion of fully cortical flakes and those which display cortex on >50% of their surface. However, examples which retain cortex on <50% of their dorsal surface are over-represented in the archaeological assemblage, while those which have no cortex on their dorsal surface are under-represented. This, along with the fact that the majority (57.8%) of the flakes studied retain less than three previous scars on their dorsal surface (table 6.4.9), indicates that although nodules were decorticated at the site, they were not extensively reduced. This is interesting as it supports the impression gained from the associated Levallois and non-Levallois core assemblages that, although core working resulted in the decortication of much of a nodule, it did not involve further prolonged episodes of flaking.

	Maximum length (mm)	**Maximum breadth (mm)**	**Maximum thickness (mm)**
Mean	45.3	44.4	19.4
Median	42.8	42.6	13.2
Min	18.4	16.2	4.5
Max	107.4	78.8	39.7
St.Dev.	18.4	15.8	8.0

Table 6.4.8 Latamne Quarry 1 "Red colluvium" flakes summary statistics (n=71, fragments excluded).

Non-Levallois flakes; technological observations (n=84)					
Portion (n=84)			Dorsal scars (n=71)		
Whole	71	84.5%	0	10	14.1%
Proximal	2	2.4%	1	22	31.0%
Distal	6	7.1%	2	9	12.7%
Mesial	1	1.2%	3	10	14.1%
Siret	4	4.8%	4	10	14.1%
			5	7	9.9%
			>5	3	4.2%
Dorsal cortex retention (n=71)			Dorsal scar pattern (n=71)		
100%	10	14.1%	*Uni-directional*	39	54.9%
>50%	12	16.9%	*Bi-directional*	2	2.8%
<50%	45	63.4%	*Multi-directional*	20	28.2%
0%	4	5.6%	*Wholly cortical*	9	12.7%
			Janus flake	1	1.4%
Butt type (n=84)			Hammer mode (n=84)		
Plain	37	44.0%	*Hard*	84	100%
Dihedral	7	8.3%	*Soft*	0	0.0%
Cortical	19	22.6%	*Indeterminate*	0	0.0%
Marginal	2	2.4%			
Mixed	4	4.8%	Relict core edge(s) (n=71)		
Obscured	8	9.5%	*Yes*	25	35.2%
Missing	7	8.3%	*No*	46	64.8%

Table 6.4.9 Technological observations for non-Levallois flakes from Latamne Quarry 1 "Red colluvium."

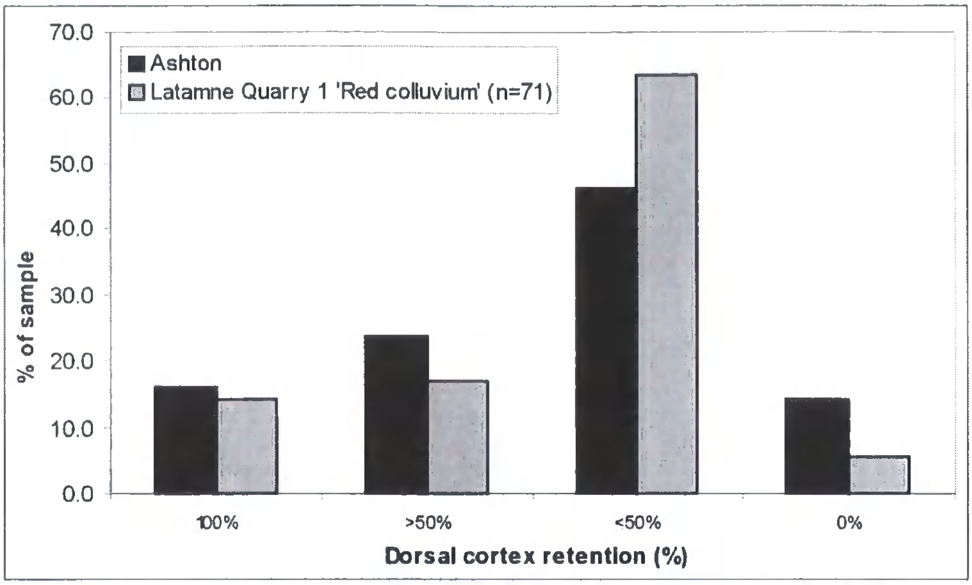

Figure 6.4.4 Comparison of percentage dorsal cortex rentention on non-Levallois flakes from Latamne Quarry 1 "Red Colluvium," and experimental data generated by Ashton (1998b) for core reduction.

Retouched Tools

Eight retouched tools, all on non-Levallois flakes, were identified and, as such, comprise a significant proportion of the assemblage (8.5%). All but one is a flaked flake. The exception is the artefact described by J. D. Clark as an "awl" (1966a, 36; 1967, 8), which consists of a flake which has been retouched around the tip to form a point.

Technology and Hominin Behaviour

The material recovered from red colluvium in Latamne Quarry 1 consists of 94 artefacts, the majority of which were recovered from a single locality (Site A). In addition, most were found at the contact between the colluvial deposits and underlying truncated gravels. All the cores and flakes studied were produced on river gravel, which, along with the fact that the size distribution of the flakes indicates that relatively undisturbed knapping debris is present, suggests that the material (or at least that from Site A) represents the primary working of immediately available raw material. Notably, the non-Levallois flake data suggests that primary decortication of nodules, rather than complete knapping sequences, are represented at the site, which is also supported by the non-Levallois core data. Consequently, it would appear that primary decortication of nodules occurred at the locale, with selected cores being transported elsewhere.

Interestingly, the three Levallois cores identified in the collections from Latamne Quarry 1 are relatively large and clearly possess the potential to be further reduced without producing significantly smaller products. In light of the fact that flaking at the site appears to have been geared towards the primary decortication of nodules, this may suggest that, while Levallois cores were initially worked at the site, only selected examples were taken away for further exploitation. Alternatively, the Levallois cores studied may have been worked in order to produce specific products which were removed from the site, while the cores themselves were left behind. In relation to this suggestion, it could be significant that no Levallois products were identified amongst the material studied.

In many ways, the artefacts from the Latamne red colluvium are similar to those from Tahoun Semaan 2 and 3 (see section 6.4.2) and Tulul Defai (see section 6.4.3) in that they represent primary flint working at a point at which raw material was immediately available. However, the fact that the assemblage is significantly smaller and appears to have been rapidly covered by fine grained deposits, suggests that the Latamne material may represent a small number of events or, in the case of the material from Site A, even a single event, rather than the time averaged palimpsests found at Tahoun Semaan 2 and 3, and Tulul Defai.

6.5 Tahoun Semaan 1

Location & History of Investigation

During the 1977 CNRS survey of the Pleistocene geology and Palaeolithic archaeology of the Orontes Valley (see chapter four, section 4.2), 58 Palaeolithic stone tools were recovered from a section cut through deposits exposed in a "birket" (small reservoir) at Tahoun Semaan (Copeland 1981, 246, Besançon and Sanlaville 1993, 24, Copeland and Hours 1993, 115). Artefacts were also recovered from an adjacent ploughed field (Copeland and Hours 1993, 115). This site, referred to as Tahoun Semaan 1, is located north of the Tahoun Semaan 2 and 3 findspots (see section 6.2 and figure 6.2.1).

Geological Background & Preferred Dating

The deposits exposed in the birket at Tahoun Semaan 1 consisted of calcareous alluvium, rich in red clay, and containing gravel partings (Besançon and Sanlaville 1993, 24). They are located between 15 m and 20 m above the Orontes, some ~10 m below the surface of the gravels exposed at Tahoun Semaan 2 and 3. The lower altitude of the Tahoun Semaan 1 deposits suggests that they post-date the Tahoun Semaan 2 and 3 fluvial deposits, which are thought to broadly be associated with MIS 8 (see section 6.2). Bridgland *et al.* (2003, figure 5) suggest that deposits at this altitude in this area of the Orontes Valley were laid down during MIS 6, whilst in the most recent contribution by a CNRS survey member on the subject, an age of MIS 4 has been suggested for the Tahoun Semaan 1 fluvial material (Besançon and Geyer 2003, 56). As these ages are both based simply on the relative altitude of the deposits in relation to the Latamne formation, they are both regarded here as possible age estimates for the Tahoun Semaan 1 deposits and the archaeology that they contain.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	No. of artefacts	% of total
Levallois cores	5	8.9%
Simple prepared cores	1	1.8%
Non-Levallois cores	13	23.2%
Definite Levallois Flakes	0	0.0%
Probable Levallois flakes	0	0.0%
Possible Levallois flakes	0	0.0%
Handaxes	1	1.8%
Non-Levallois flakes	35	62.5%
Flake tools	1	1.8%
Total	56	100%

Table 6.5.1 Material analysed from Tahoun Semaan 1.

A total of 56 artefacts recovered from the fluvial deposits found at Tahoun Semaan 1 have been studied (see table 6.5.1). All are stored in the National Museum, Damascus and were recovered from deposits exposed in section.

Taphonomy of lithic assemblage

Cores from Tahoun Semaan 1 (n=19)					
Unabraded	10	52.6%	*No edge damage*	0	0.0%
Slightly abraded	7	36.8%	*Slight edge damage*	6	31.6%
Moderately abraded	2	10.5%	*Moderate edge damage*	13	68.4%
Heavily abraded	0	0.0%	*Heavy edge damage*	0	0.0%
Unstained	5	26.3%	*Unpatinated*	0	0.0%
Lightly stained	7	36.8%	*Lightly patinated*	0	0.0%
Moderately stained	7	36.8%	*Moderately patinated*	17	89.5%
Heavily stained	0	0.0%	*Heavily patinated*	2	10.5%
Unscratched	14	73.7%			
Lightly scratched	2	10.5%			
Moderately scratched	3	15.8%			
Heavily scratched	0	0.0%			

Table 6.5.2 Condition of cores from Tahoun Semaan 1.

	Abrasion	Edge Damage	Staining	Patination	Scratching
TS 1/1255	Slight	Slight	None	Heavy	None

Table 6.5.3 Condition of handaxe from Tahoun Semaan 1.

Flakes from Tahoun Semaan 1 (n=36)					
Unabraded	14	38.9%	*No edge damage*	0	0.0%
Slightly abraded	15	41.7%	*Slight edge damage*	10	27.8%
Moderately abraded	3	8.3%	*Moderate edge damage*	20	55.6%
Heavily abraded	4	11.1%	*Heavy edge damage*	6	16.7%
Unstained	17	47.2%	*Unpatinated*	0	0.0%
Lightly stained	6	16.7%	*Lightly patinated*	2	5.6%
Moderately stained	6	16.7%	*Moderately patinated*	16	44.4%
Heavily stained	7	19.4%	*Heavily patinated*	18	50.0%
Unscratched	32	88.9%			
Lightly scratched	2	5.6%			
Moderately scratched	2	5.6%			
Heavily scratched	0	0.0%			

Table 6.5.4 Condition of flakes from Tahoun Semaan 1.

The majority of the Tahoun Semaan 1 artefacts are in fresh or only slightly abraded condition, indicative of the fact that most of the material in the collection has not been subject to significant transport (see tables 6.5.2, 6.5.3 and 6.5.4). Having said this, seven flakes and two cores retain evidence of more severe fluvial abrasion. This small, seemingly derived, component of the assemblage has been excluded from further study. All artefacts in the collection show some degree of patination, whilst most (64.3%) are either unstained, or only lightly stained.

Although the majority of the artefacts from Tahoun Semaan 1 are in fresh condition, all display a degree of edge damage, and many are at least moderately affected (69.6%). In the case of the abraded artefacts, this probably reflects the effects of fluvial reworking, however, damage to the fresher material may have been caused by trampling, indicating that the artefacts were exposed on a land surface for a period of time. Support for this is provided by the fact that some of the artefacts studied (16.1%) display evidence of surface scratching, indicative of the prolonged exposure of artefacts to the elements (Stapert 1976). This suggests that at least some of the artefacts from Tahoun Semaan 1 originate from a temporary land surface within the fine grained fluvial deposits from which they were recovered.

Technology of lithic assemblage

Raw Material

	Levallois cores (n=5)	**Non-Levallois cores (n=11)**	**Non-Levallois flakes (n=29)**
Raw material			
Fresh	20.0%	18.2%	17.2%
Derived	60.0%	54.5%	51.7%
Indeterminate	20.0%	27.3%	31.0%
Blank form			
Nodule	20.0%	18.2%	-
Shattered Nodule	0.0%	0.0%	-
Flake	0.0%	0.0%	-
Thermal flake	0.0%	0.0%	-
Indeterminate	80.0%	81.8%	-

Table 6.5.5 Raw material and inferred blank form for artefacts studied from Tahoun Semaan 1 (the single handaxe and simple prepared core from the site are both on fluvially derived nodules).

The artefacts from Tahoun Semaan 1 are all produced on coarse-grained chert/flint. Fluvially derived raw material was preferentially employed (see table 6.5.5), although one Levallois core, two non-Levallois cores and five non-Levallois flakes were produced using raw material from a primary context(s). As the artefacts originate from fine grained fluvial deposits, no immediate source of chert/flint can be discerned. However, it is likely that gravel banks and bars would have existed in the vicinity of the site, which could have provided a source of fluvially derived chert/flint blanks. Futhermore, the pre-existing river gravels associated with the Tahoun Semaan 2 and 3 findspots are located just to the north of Tahoun Semaan 1 (see figure 6.2.1). Possible points of origin for the chert/flint from a primary raw material source are less easy to discern. The majority of the artefacts from

Tahoun Semaan 1 (72.2%; combined figure) do not retain enough evidence to assess the form of the original blanks (table 6.5.5). Where blank forms can be identified nodules were exclusively exploited.

Levallois Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
TS 1/1263	60.4	82.3	23.8	141	1.36	0.29
TS 1/1298	83	56.4	27.3	94	0.68	0.48
TS 1/1290	55.5	54.3	19.7	52	0.98	0.36
TS 1/1270	69	62.2	6.3	83	0.90	0.10
TS 1/1209	56.3	68.3	16.7	85	1.21	0.24

Table 6.5.6 Tahoun Semaan 1 Levallois cores summary statistics.

Levallois cores; technological observations (n=5)						
Preparation method (n=5)			Exploitation method (n=5)			
Bipolar	1	20.0%	*Lineal*	3	60.0%	
Centripetal	4	80.0%	*Bipolar recurrent*	1	20.0%	
			Failed	1	20.0%	
Preparatory scars on flaking surface (n=5)			Preparatory scars on striking platform (n=5)			
1-5	1	20.0%	1-5	0	0.0%	
6-10	3	60.0%	6-10	4	80.0%	
11-15	0	0.0%	11-15	0	0.0%	
Obscured	1	20.0%	>15	1	20.0%	
Position of cortex on striking platform (n=5)			Percentage cortex on striking surface (n=5)			
None	1	20.0%	0	1	20.0%	
Central	1	20.0%	>0-25%	0	0.0%	
Central and one edge	1	20.0%	>25-50%	1	20.0%	
Central and more than one edge	2	40.0%	>50-75%	3	60.0%	
			>75%	0	0.0%	
Levallois products from flaking surface (n=5)			Type of products from flaking surface (n=5)			
0	0	0.0%	*Unexploited*			
1	4	80.0%	*Flake*	3	60.0%	
2	1	20.0%	*Overshot*	1	20.0%	
			Failed	1	20.0%	
Earlier flaking surface (n=5)						
Yes	0	0.0%				
No	5	100%				
			Dimension of final Levallois products (n=9)			
Remnant distals on striking platform (n=5)			*Min Length*	30.4	*Min Breadth*	26.8
Yes	2	40.0%	*Max Length*	57.5	*Max Breadth*	49.9
No	3	60.0%	*Mean Length*	47.4	*Mean Breadth*	37.8

Table 6.5.7 Technological observations for Levallois cores from Tahoun Semaan 1.

Five Levallois cores were identified in the extant collection from Tahoun Semaan 1. They tend to be small (see table 6.5.6) and round in planform (mean elongation = 0.94). Four of the five cores were fairly thin when discarded (Th/B = <0.4), indicating that these cores had been extensively reduced. Intensive reduction is also hinted at by the fact that two of the cores exhibit remnants of the distal ends of large flake scars on their striking platform surfaces (table 6.5.7). Four of the Levallois cores analysed display evidence of centripetal preparation of the final flaking surface, the convexities necessary for Levallois flaking being created through continuous working of the whole surface. As noted in previous sections of this chapter, studies suggest that centripetal preparatory strategies are common towards the end of Levallois reduction sequences (e.g. Dibble 1995, Meignen 1995).

As with many of the heavily reduced Levallois cores from Tahoun Semaan 2 and 3 and Tulul Defai, the size of several of the extensively flattened examples from Tahoun Semaan 1 could potentially have allowed for them to be re-prepared to enable products to be detached from a flaking surface. Given that this approach was not undertaken at Tahoun Semaan 1, it seems that large, broad flakes were a desired product, and that techniques were not adopted which might have resulted in the production of smaller products. The only core which theoretically retains enough volume to allow for further reworking without producing excessively diminutive products is TS 1/1298 (see table 6.5.6). Notably, however, this core was discarded following the detachment of a final consumptive removal which shattered the flaking surface. Therefore, all the Levallois cores analysed from Tahoun Semaan 1 can be regarded as having being discarded once no further productive working was possible.

All but one of the Levallois cores studied retain cortex on the striking platform surface, enabling identification of the raw material source. Three of these were produced on blanks originating from a fluvially derived source of chert/flint, while one was produced on material from a primary raw material source (table 6.5.5). As raw material was not *immediately* available at Tahoun Semaan 1 (although, as has been noted, sources of derived raw material are likely to have been available not far from the site) all the Levallois cores must have been brought in from elsewhere in the landscape. Consequently, unlike Tahoun Semaan 2 and 3, and Tulul Defai, which are located directly on a source of raw material, this locale cannot be interpreted as a place where primary lithic-working was undertaken.

Simple Prepared Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
TS 1/1272	91.9	78.4	50.8	382	0.85	0.65

Table 6.5.8 Tahoun Semaan 1 simple prepared core summary statistics.

One simple prepared core was identified amongst the Tahoun Semaan 1 assemblage. It is medium-sized, round in planform (table 6.5.8) and has been subject to convergent unipolar exploitation. It retains its nodular blank form and could arguably have been further reduced (Th/B= >0.4), but seems to reflect the *ad hoc* exploitation of a nodule which possessed existing Levallois like convexities.

Levallois Products

No Levallois products were identified amongst the material studied from Tahoun Semaan 1.

Non-Levallois Cores

	Maximum dimensions (mm)	Weight (grams)
Mean	74.3	143.8
Median	76.9	153.0
Min	57.5	32.0
Max	93.8	224.0
St.Dev.	12.8	66.0

Table 6.5.9 Tahoun Semaan 1 non-Levallois cores summary statistics (n=11).

Non-Levallois cores; technological observations (n=11)					
Overall core reduction (n=11)			Core episodes (n=36)		
Migrating platform cores	10	90.9%	*Type A: Single Removal*	2	5.6%
Discoidal	1	9.1%	*Type B: Parallel flaking*	3	8.3%
			Type C: Alternate flaking	18	50.0%
			Type D: Unattributed removal	13	36.1%
Flake scars/core (n=11)			Core episodes/core		
1-5	2	18.2%	*Min*	2	-
6-10	5	45.5%	*Max*	6	-
11-15	3	27.3%	*Mean*	3.3	-
>15	1	9.1%			
Max	17	-	Flake scars/core episode		
Mean	9.8	-	*Min*	1	-
			Max	13	-
% Cortex (n=11)			*Mean*	3	-
0	2	18.2%			
>0-25%	2	18.2%	Blank form retained? (n=11)		
>25-50%	4	36.4%	*Yes*	2	18.2%
>50-75%	3	27.3%	*No*	9	81.8%
>75%	0	0.0%			

Table 6.5.10 Technological observations for non-Levallois cores from Tahoun Semaan 1.

Eleven non-Levallois cores were identified amongst the extant artefacts from Tahoun Semaan 1; ten migrating platform cores and a single example of a volumetrically discoidal core. They are similar in size to the Levallois cores from the site but, presumably as a result of their more globular profile, they tend to be heavier (see tables 6.5.6 and 6.5.9). Reduction of the non-Levallois cores from Tahoun Semaan 1 seems to have been reasonably intensive with an average of 9.8 removals per core but, as they on average only retain 3.3 episodes, consisting of an average of just 3 flake scars, working does not appear to have been extended (table 6.5.10). The fact that only 18.2% of the cores retain the form of the blank exploited supports the conclusion that they were fairly intensively worked; all of these are nodules. Six of the non-Levallois cores possess water-worn cortex, two possess fresh chalky cortex and the remaining three are completely decorticated (table 6.5.5). As raw material was not *immediately* available at Tahoun Semaan 1, all the non-Levallois cores, or the blanks on which they were produced, must have been brought into the site from elsewhere.

Handaxes

The only handaxe from Tahoun Semaan 1 is a broken butt. It has been formed through hard hammer flaking of a water-worn nodule. The fact the break surfaces display the same moderate level of patination as the rest of the artefact indicates that the damage did not occur in the recent past.

Non-Levallois Flakes

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	58.6	47.0	15.8
Median	57.5	49.0	16.3
Min	24.7	27.5	8.6
Max	90.8	65.9	24.6
St.Dev.	17.9	12.3	4.9

Table 6.5.11 Tahoun Semaan 1 non-Levallois flakes summary statistics (n=21, fragments excluded).

Non-Levallois flakes; technological observations (n=29)					
Portion (n=29)			Dorsal scars (n=21)		
Whole	21	72.4%	0	4	19.0%
Proximal	3	10.3%	1	5	23.8%
Distal	3	10.3%	2	5	23.8%
Mesial	0	0.0%	3	0	0.0%
Siret	2	6.9%	4	2	9.5%
			5	2	9.5%
			>5	3	14.3%
Dorsal cortex retention (n=21)			Dorsal scar pattern (n=21)		
100%	4	19.0%	*Uni-directional*	10	47.6%
>50%	3	14.3%	*Bi-directional*	0	0.0%
<50%	9	42.9%	*Multi-directional*	5	23.8%
0%	5	23.8%	*Wholly cortical*	6	28.6%
Butt type (n=29)			Hammer mode (n=29)		
Plain	11	37.9%	*Hard*	24	82.8%
Dihedral	0	0.0%	*Soft*	3	10.3%
Cortical	3	10.3%	*Indeterminate*	2	6.9%
Natural (but non-cortical)	1	3.4%			
Marginal	1	3.4%	Relict core edge(s) (n=21)		
Soft hammer	3	10.3%	*Yes*	5	23.8%
Obscured	7	24.1%	*No*	16	76.2%
Missing	3	10.3%			

Table 6.5.12 Technological observations for non-Levallois flakes from Tahoun Semaan 1.

The non-Levallois flakes from Tahoun Semaan 1 tend to be medium-sized (see table 6.5.11) and were produced using a hard hammer (82.8%), however, three definite soft hammer flakes, indicative of handaxe thinning, were also present (table 6.5.12). This is notable as no handaxes worked using a soft percussor were identified amongst the extant material from the site.

Retouched Tools

One retouched tool was identified amongst the collection studied from Tahoun Semaan 1, consisting of a non-Levallois flake with minimally invasive, rectilinear retouch confined to the distal end.

Technology and Hominin Behaviour

The material studied from Tahoun Semaan 1 was recovered from fine grained alluvial sediments and is divisible into two groups; a handful of fluvially derived artefacts and a larger, but not numerous, collection of relatively fresh material, upon which this analysis has focussed. Whereas the other Middle Palaeolithic assemblages previously discussed in this chapter consist of 411 (Tahoun Semaan 2 and 3), 578 (Tulul Defai) and 94 (Latamne Quarry 1 "Red colluvium") artefacts, the fresh assemblage from Tahoun Semaan 1 comprises just 45 pieces. This difference in relative assemblage size probably reflects the fact that unlike the other sites, Tahoun Semaan 1 is not located directly on top of a raw material source, and as such was not a place where primary lithic-working was undertaken.

Notably, the artefacts studied from Tahoun Semaan 1 seem to represent material at the far end of the reduction spectrum. All Levallois cores are either heavily reduced and can be said to have been discarded once large broad flakes could no longer be detached, or display evidence of a knapping accident which ended any scope for further productive working. Similarly, the non-Levallois cores appear to have been fairly intensively worked. The single handaxe recorded amongst the assemblage is a fragment broken in antiquity, while a number of soft hammer thinning flakes, potentially indicative of handaxe resharpening, were also identified. Consequently, the material from Tahoun Semaan 1 seems to represent the low drop out of artefacts during Middle Palaeolithic hominin activity away from raw material sources and is comparable to similar situations such as that at Site N, Maastricht-Belvédère (Netherlands; Roebroeks *et al.* 1992).

6.6 Summary of the Middle Palaeolithic Occupation in the Orontes Valley

When one considers the Middle Palaeolithic sites from the Orontes Valley presented here in contrast to the Lower Palaeolithic sites of the same area, the variation that they display is striking. Whilst Lower Palaeolithic core working - and approaches to handaxe production - could be described as somewhat monolithic, though flexible in application, it is more difficult to characterise these Middle Palaeolithic sites as united in any one sense. Not only is technological variability apparent within sites - Tahoun Semaan 1, 2 and 3 and Tulul Defai have all produced evidence for handaxe production as well as Levallois flaking - but also between sites. This is not to imply that there are not some commonalities; nearly all the sites presented here are located in direct proximity to raw material sources, in valley-side positions which would have allowed monitoring of the valley below. Taken together, these sites all shed light upon different aspects of hominin technology and landuse practices during the Middle Palaeolithic, and emphasise the importance of re-locating these assemblages within their landscape settings.

It is hard to speculate as to the timescales over which these collections accumulated, and it is likely that most can be considered time-averaged palimpests. However, rather than detracting from the interpretive potential of these sites, this fact is actually key to understanding them. Sites such as Tahoun Semaan 2 and 3, and Tulul Defai represent places that were visited repeatedly, and at which a similar range of technological behaviours were undertaken many times. Raw material was immediately available at nearly all these sites, and particular technological strategies relate to extraction and primary lithic-working. For instance, decortication of primary chert/flint was undertaken at the Latamne Quarry 1 "Red colluvium" site, and complete knapping sequences (relating to non-Levallois core reduction) are apparent at Tulul Defai, again using immediately available fresh chert/flint. However, it is also possible to look beyond each individual scatter to the wider landscape within which they were situated; particular classes of artefact were carried in and out - handaxes were arguably produced at, and exported from, Tulul Defai, only broken pieces and roughouts being left at the site itself. The passage of handaxes through Tahoun Semaan 1 is recorded only by the presence of a fragment and a handful of thinning flakes.

Most notable, however, is the treatment of Levallois material. Levallois cores are present at all these sites and at most of them, attest to protracted curation and reduction to the point of exhaustion. This pattern is suggestive of hominin movement around the broader landscape and away from raw material sources, travelling equipped with Levallois cores as a source of flakes for tools and cutting edges. These cores were discarded upon return to a raw material source, where the key elements of the transported tool kit could be replaced. Thus material from gravel sources in the valley bottom came to be discarded at Tulul Defai, and exhausted Levallois cores on fresh raw material imported into Tahoun Semaan 2 and 3. The counterparts of these sites at which hominins were "gearing up" with cores are reflected by the ephemeral occurrence from Tahoun Semaan 1, from which a small, intensively worked assemblage was recovered away from available raw material; exhausted artefacts seem to have dropped out here in the context of use. No single strategy can be claimed to be universal, however; the assemblage from the red colluvium at Latamne seemingly reflects the export of Levallois products, and not Levallois cores.

It is also apparent that approaches to Levallois flaking vary immensely, and throughout reduction. Many of the Levallois cores from these sites were reworked at the very end of their use-life using centripetal removals to prepare their flaking surface, and a final lineal removal then attempted (though frequently unsuccessfully). However, it is also apparent that these cores must have been subject to recurrent exploitation; many retain remnants of distal scars around the margins of their flaking surfaces which indicate that they were originally much larger. These observations suggest that different Levallois methods were flexibly applied throughout reduction, and there are no clear-cut divisions between different methods; rather, they are dynamically applied in response to the evolving possibilities of particular cores. Indeed, the divisions between particular approaches to core working are not necessarily technologically discrete; it is likely that the small discoidal cores from Tulul Defai are exhausted Levallois cores.

The Middle Palaeolithic sites of the Orontes Valley reflect a technologically flexible approach to exploiting the landscapes of the river valley itself and the plateaus forming the edges of the catchment. Whereas Lower Palaeolithic sites from the area seem, in many ways, to be "the same place" the sites presented here can be seen as very different places, treated in different ways, and at which different practices were undertaken. Moreover, this very variability allows us to look from the scatter into the landscape itself, and to re-animate the knowledgeable hominins moving within them.

Chapter 7
The Earlier Palaeolithic of the Euphrates Valley – History of Research and Chronostratigraphic Framework

7. 1 Introduction

The river Euphrates (or Al-Furat as it is known in Arabic) forms the largest drainage system in the Near East (see figure 7.1.1), extending some 2,781 km in length. The river's headwaters are located in north-eastern Turkey, where the upper reaches are formed by two separate river systems; the Karasu which rises ~30 km north east of Erzerum in the Kargazari Mountains, and the Murat which originates ~70 km north of Lake Van near Mount Ararat. These merge near Keban to form the Euphrates itself. Along its upper course, the Euphrates flows through the Taurus mountain range, then, after some ~500 km, enters the uplands of the Arabian platform. Subsequently, the river continues south-westwards for a further ~300 km before crossing the Syrian border near Jerablus.

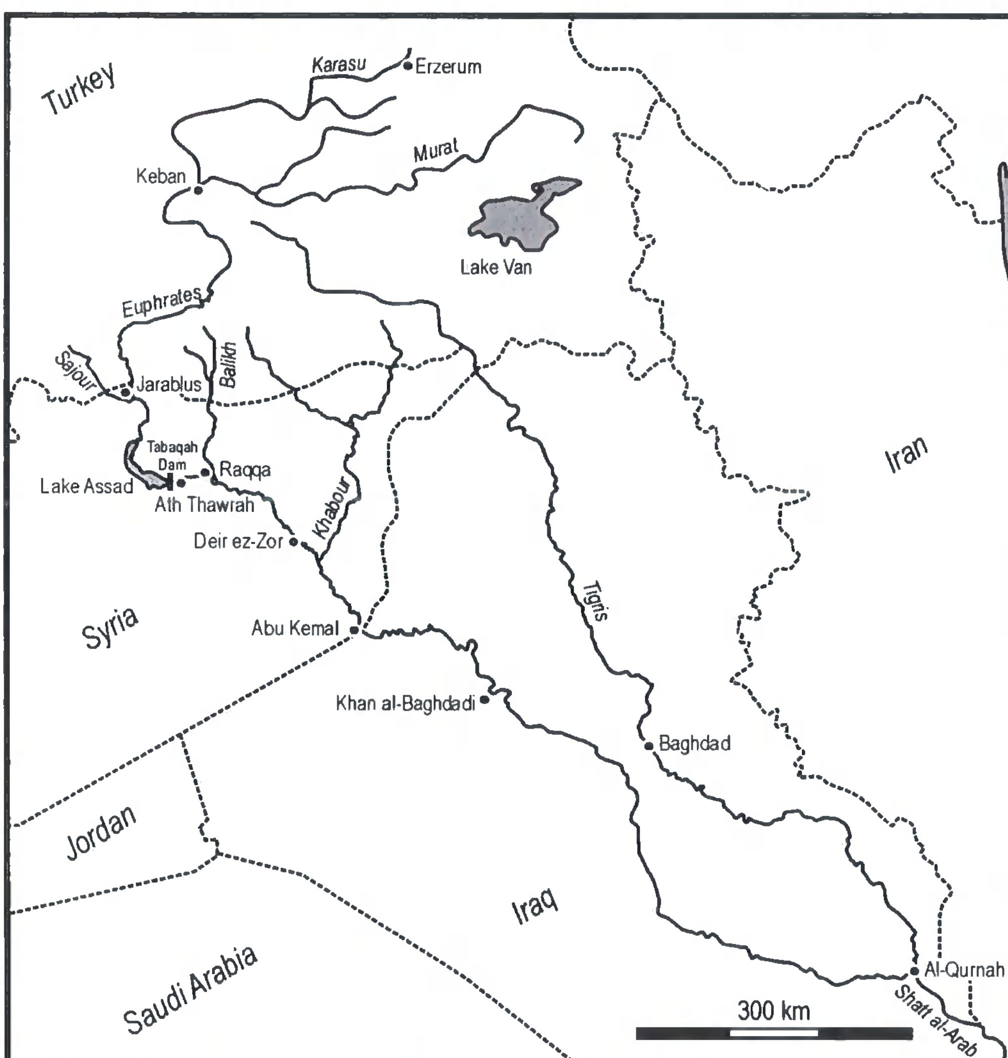

Figure 7.1.1 Regional map, showing full drainage of the Euphrates and its major tributaries, along with the location of places referred to in section 7.1.

The Syrian stretch of the Euphrates extends for ~500 km across the Arabian platform. The river flows initially south from the Turkish border, before turning south-east at Meskene. This change in course has created a great bend in the river, which is now flooded by the waters of Lake Assad, created by the building of the Tabaqah Dam across the Euphrates at Ath Thawrah. From Ath Thawrah the river flows south-eastwards across north-eastern Syria before crossing the border with Iraq, south-west of Abu Kemal. From here the river continues south-westwards for ~200 km to Khan al-Baghdadi. Downstream it passes out of the uplands of the Arabian platform into central Iraq where the Euphrates has formed a delta plain shared with the River Tigris. At Al-Qurnah, just north of Basra, these two river systems converge to form the Shatt al-Arab before emptying into the Persian Gulf.

This research is focussed on the stretch of the Euphrates in Syria. Here the river flows across the Arabian platform, into which the river has incised by ~60 m or more, to create a gorge. This gorge is inset with a series of Pleistocene river terraces which have produced earlier Palaeolithic artefacts, both from their surfaces and the main body of the deposits. This study concentrates on a sample of these collections from locations situated between Jerablus and Deir ez-Zor. Additionally, other earlier Palaeolithic artefact accumulations have been recovered from analogous contexts located within several tributary valleys of the Syrian Euphrates, most notably the Sajour and the Balikh. The former enters the main river from the south near Jerablus, whilst the latter joins from the north near Raqqa (see figure 7.1.1). Selected assemblages from both these areas have also been analysed. The purpose of this chapter is to outline the historical context of these collections and the chrono-stratigraphic frameworks in which they have been, and are presently, situated.

7. 2 History of investigations

Although the first recorded discovery of Palaeolithic stone tools from the Euphrates Valley in Syria was made in 1907 by T.-J. Arne, who recovered material in the area surrounding the town of Jerablus (Arne 1909, 24), the presence of Pleistocene river terraces in the area was not remarked upon until the mid-1920s. During this period L. Passemard identified a series of fluvial deposits at varying heights above the modern river at Sabkhah (Passemard 1926, 367; see figure 7.2.1), and also recovered the first Palaeolithic artefact directly associated with the Pleistocene river terraces of the Syrian Euphrates: a handaxe obtained from fluvial deposits located ~27 m above the modern river at an unspecified locality (Passemard 1926, 367).

During this period prior to the Second World War, R. Wetzel also observed terrace deposits at varying heights above the modern Euphrates in the vicinity of Sirrin (Haller, 1945-1948, 53), while in 1943 Maurice Pervès noted similar deposits in the Euphrates Valley at Raqqa, Ayash, Abu Kemal and at a locality ~4 km upstream of Deir ez-Zor (Pervès 1948; 1964; see figure 7.2.1). The deposits at Ayash, Raqqa and upstream of Deir ez-Zor also produced artefacts; further stone tools were collected from the surface of river terrace gravels at Abu Kemal. In addition to deposits in the main valley, Pervès also found artefacts associated with ancient fluvial deposits at Safeh and Kamechlie in the valley of the Khabour, a tributary of the Euphrates (Pervès 1948, 116; 1964, 424; see figure 7.2.1).

After the investigations carried out by Pervès, the Pleistocene deposits of the middle Euphrates received scant attention until the early 1960s. At this time Willem J. Van Liere studied the terrace deposits of several rivers in Syria, including the area of the Euphrates Valley between Raqqa and Abu Kemal, and the valley of the Khabour (Van Liere 1960-1961, 41-49). During the same period, in response to the construction of the Tabaqah Dam, Jean De Heinzelin surveyed the quaternary formations of the Euphrates between Qushlat Yusuf Basha and Ath Thawrah (De Heinzelin 1965; 1967; see figure 7.2.1). Also in the 1960s, as part of a survey of the geology of Syria, a team of Soviet geologists recorded Euphrates Pleistocene fluvial deposits at Jerablus, Meskene, Kasra, Raqqa, Maadan, Halabiyeh, Deir ez-Zor, Mayadin and Abu Kemal (Ponikarov *et al.*1966, 101-104; 1967, 149-154), and during the course of the same research K. Mirzayev recovered Palaeolithic artefacts from unspecified contexts at Meskene, Raqqa, Deir-ez Zor, Mayadin and Abu Kemal (Ponikarov *et al.* 1967, figure 31; see figure 7.2.1).

In the decade following this flurry of research, only sporadic investigations were carried out into the Pleistocene archaeology and geology of the Syrian Euphrates. For instance, during the course of a general archaeological survey in the Djezireh region of northern Syria carried out in 1969 under the auspices of the French *Centre Nationale de la Réchèrche Scientifique* (CNRS) project RCP 78, significant collections of Palaeolithic artefacts were recovered from the surface of terrace deposits near Chnine, located close to the confluence of the Euphrates and its tributary, the Balikh (Cauvin 1970, Malenfant 1976; see figure 7.2.1). During the same period a general environmental survey carried out as part of excavations at the medieval citadel at Dibsi Faraj, resulted in the discovery of Palaeolithic stone tools within Pleistocene wadi gravels located on the edge of the Euphrates floodplain (Wilkinson and Moore 1978, 26, Wilkinson 1978, 223; see figure 7.2.1). However, it was not until the late 1970s that further research was initiated in this region that specifically aimed to study the Palaeolithic archaeology and Pleistocene geology of the Euphrates.

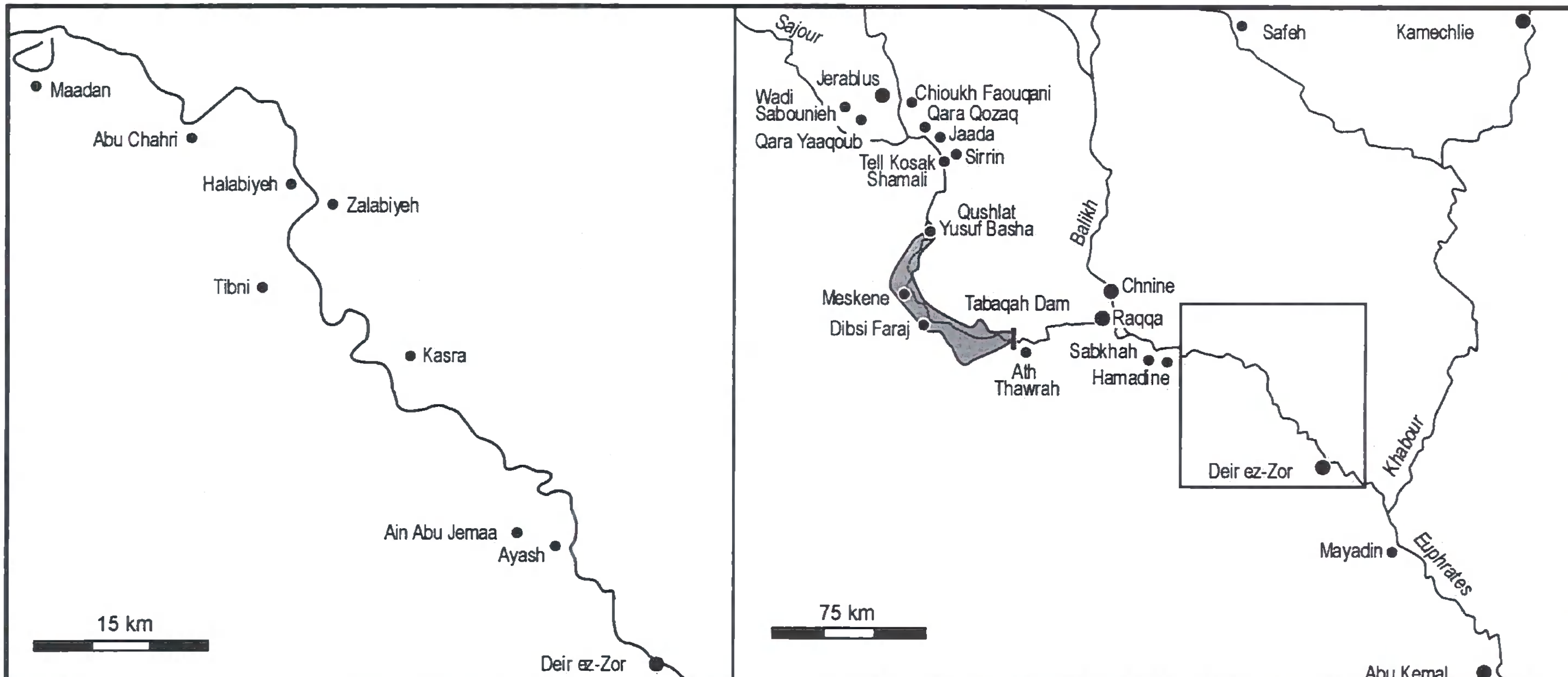

Figure 7.2.1 *Regional map, showing full drainage of the Syrian Euphrates and its major tributaries, along with the location of all places referred to in section 7.2 and 7.3.*

In 1978 an integrated survey of the Pleistocene geology and archaeology was instigated along the reach of the Euphrates stretching from the southern end of the Tabaqah Dam to Deir-ez Zor, and the lower reaches of the Balikh (Besançon *et al.* 1980a, Besançon and Sanlaville 1981, Copeland 2004, Sanlaville 2004; see figure 7.2.1). This research represented the first of three seasons (1978, 1979 and 1980) in which fieldwork investigating the Quaternary record of the Syrian Euphrates was carried out by Jacques Besançon, Paul Sanlaville, Francis Hours, Lorraine Copeland and Sultan Muhesen as part of the CNRS project RCP 438. This formed part of a wider research programme entitled *L'homme et le milieu dans la region Levantine Quaternaire* which was geared towards establishing local Pleistocene chronologies in different ecological zones in Syria (see chapter four, section 4.2 for further discussion). The research involved extensive mapping of river terraces and lead to the recovery of large collections of artefacts, both from within the Euphrates terrace deposits and on their surface.

Whilst the 1978 investigations focussed on the stretch of the Euphrates between Raqqa and Deir ez-Zor, the subsequent 1979 season considered the area of the Euphrates valley between Jerablus and Qara Qozaq, along with the tributary valley of the Sajour (Besançon *et al.* 1980b, Besançon and Sanlaville 1981, Copeland 2004, Sanlaville 2004; see figure 7.2.1). The 1980 project researched the stretch of the Syrian Euphrates downstream of Mayadin and the Khabour basin (Besançon and Sanlaville 1981; see figure 7.2.1). Following this research various members of the RCP 438 team were involved in similar projects which considered the Pleistocene deposits of the Euphrates and its tributaries in Turkey (e.g. Minzoni-Déroche and Sanlaville 1988, Besançon 1999-2002), whilst Jacques Besançon, along with Bernard Geyer, initiated further investigations into the deposits of the Syrian Euphrates between Deir ez-Zor and Abu Kemal (Besançon and Geyer 2003; see figure 7.2.1).

The years that followed the RCP 438 research have seen only limited work on the Palaeolithic record of the Euphrates Valley in Syria. As is the case across the country, archaeological research has become increasingly based on multi-period landscape surveys, which sometimes result in the recovery of Palaeolithic artefacts. For instance, Palaeolithic material was recovered during the course of a general archaeological survey carried out under the auspices of CNRS between 1989 and 1991 in the upper Khabour basin (Nishiaki 2000). The other main source of Palaeolithic material recovered over the last decade is material fortuitously recovered during the excavation of later prehistoric and historic sites, as for example at Tell Kosak Shamali (Nishiaki 2001; see figure 7.2.1) where Pleistocene terrace deposits were also encountered (Oguchi 2001). In addition to this archaeological research, recent years have also seen some reassessment of the Pleistocene terrace deposits of the Syrian Euphrates (e.g. Demir *et al.* 2007b; 2007c).

7.3 Chrono-stratigraphic Framework

The Pleistocene fluvial deposits of the Syrian Euphrates are located in a gorge incised into the Arabian platform. Along its upper reaches, between the Turkish border and Ath Thawrah, the river has incised into Miocene limestone and underlying Oligocene/Eocene limestones and marls. Downstream of Ath Thawrah to the Iraqi border the river has cut into Miocene limestone, gypsum, sandstone and marl (Ponikarov et al. 1967, 139). The work carried out by Passemard in the 1920s (see section 7.2) represented the first attempt to establish a chrono-stratigraphic framework for the Pleistocene fluvial deposits of the Syrian Euphrates. Based on the terrace deposits found at Sabkhah, he recognised three terrace levels located at 56 m, 31 m and 15 m above the current river (Passemard 1926, 367). During the same period Wetzel noted a similar terrace sequence upstream at Sirrin at 60 m, 30 m and 17 m above the level of the modern Euphrates (Haller 1945-1948, 53). Subsequent work carried out in 1943 by Pervès identified two Euphrates terrace levels represented by Pleistocene river gravels located 80 m above the modern river at Halabiyeh and fluvial deposits some 3 m thick, located 3 m above the Euphrates at a point ~4 km upstream of Deir ez-Zor (Pervès 1964, 424).

Expanding on the research of Passemard, Wetzel and Pervès, in the early 1960s Van Liere produced a chronostratigraphic sequence for the Quaternary deposits of the Syrian Euphrates based on fieldwork carried out between Raqqa and Abu Kemal, by drawing on his experience of the terrace sequences of other Syrian rivers. In his sequence Van Liere recognised four distinct formations (see table 7.3.1), the earliest of which composed a complex sequence of high gravels (some of which he believed to be early Pleistocene fluvial deposits), while others were considered to represent pre-Pleistocene fluvial and/or lacustrine aggradations (Van Liere 1960-1961, 45). These deposits were thought to be post-dated by a major period of incision by the Euphrates, followed (during the Middle Pleistocene) by the deposition of a "valley fill" found at an elevation of up to ~40 m above the modern river (Van Liere 1960-1961, figure 31). This material was argued to have been subsequently eroded and reworked to form what Van Liere termed the "Main gravel terrace", which in places was overlain by 5-8 m of stratified silts. This "Main gravel terrace" was identified 2-3 m above the river at Raqqa, 10-15 m at Deir-ez Zor and 1-2 m at Abu Kemal (Van Liere 1960-1961, 46). Below this, Van Liere identified a Holocene terrace above the floodplain (Van Liere 1960-1961, 48).

		Euphrates Quaternary deposits		
	Height above river (m)	Van Liere (1960-1961)	De Heinzelin (1965; 1967)	Ponikarov *et al.* (1967)
	0			Q4
Holocene		Low terrace	Muraybit formation	
Upper Pleistocene	10	"Main gravel terrace"		Q3
	20		Shajara formation	
	30	"Valley fill"		Q2
Middle Pleistocene	40			
	50			
	60			
	70			Q1
Lower Pleistocene	80	High gravels	Dibsi formation	
Pre-Pleistocene	90			

Table 7.3.1 Early chronostratigraphic frameworks proposed for Quaternary deposits in the Euphrates Valley, Syria.

In the mid 1960s De Heinzelin (1965; 1967) identified a similar Quaternary sequence to that of Van Liere upstream of Raqqa, between Qushlat Yusuf Basha and Ath Thawrah (see table 7.3.1). Here, three distinct deposits were recognised which De Heinzelin termed the Dibsi, Shajara and Muraybit formations. The Dibsi formation, located between 70 m and 90 m above the alluvial plain of the modern Euphrates, was thought by De Heinzelin to broadly equate to Van Liere's high gravels (De Heinzelin 1965, 44), and to represent the deposits of a braided river system that existed before the incision of the Euphrates Valley (De Heinzelin 1965, 44). These deposits were seen as being post-dated by a period of downcutting by the Euphrates, followed by the emplacement of the deposits of the Shajara formation. Located 20 m to 30 m above the alluvial plain (De Heinzelin 1965, 37), they were thought to, at least partly, correlate with Van Liere's "Main gravel terrace" (De Heinzelin 1965, 44). A second, later aggradation was thought to be represented by the Muraybit formation deposits, which were located between 1 m and 10 m above the alluvial plain (De Heinzelin 1965, 37), and equated to Van Liere's lowest terrace (De Heinzelin 1965, 44).

A similar picture to that painted by Van Liere and De Heinzelin emerged from contemporary work carried out by a Soviet team engaged in the mapping the geology of Syria (see table 7.3.1). This research identified four chronologically distinct Quaternary formations along the Euphrates valley which were labelled from Q1 to Q4, with Q1 representing the oldest deposits and Q4 the Holocene floodplain. The Soviet team recorded Q1 gravels between 60 m and 80 m above the modern river at Maadan, Halabiyeh, Deir ez-Zor and Mayadin (Ponikarov *et al.* 1967, 151); Q2 deposits were identified between 25 m and 30 m above the Euphrates at Jerablus, Meskene, Raqqa, Deir ez-Zor and Abu Kemal (Ponikarov *et al.* 1967, 152) and Q3 material was noted between 12 m and 15 m above the river at Jerablus, Meskene, Raqqa, Deir ez-Zor, and at the confluence between Euphrates and the River Khabour (Ponikarov *et al.* 1967, 153). Futhermore, the Q2 and Q3 formations were also recognised between 20-30 m, and 8-10 m above the river in the Khabour Valley itself (Ponikarov *et al.* 1967, 150).

In summary, by the end of the 1960s a general sequence had emerged for the Quaternary deposits found along the Syrian Euphrates. This consisted of a complex series of high level gravels located between 60 and 90 m above the river, some of which were seen to represent pre-Pleistocene lacustrine and fluvial deposits, while others were considered to have been deposited by the Euphrates during the earlier Pleistocene. These deposits were post-dated by two main Pleistocene fluvial aggradations located, between 1 m and 30 m above the modern river.

The work carried out by RCP 438 team in the late 1970s and early 1980s (see section 7.2) built upon and refined this framework. Using the criteria applied by the same authors to distinguish separate fluvial formations in the Orontes Valley (see chapter four, section 4.2) this project identified a series of Pleistocene, and possibly pre-Pleistocene, fluvial deposits along the stretch of the Euphrates located between Raqqa and Abu Kemal, and the reach of the river between Jerablus and Qara Qozaq. In addition, the same research recorded fluvial deposits along two Euphrates tributaries; the Balikh and the Sajour.

Between Raqqa and Abu Kemal on the Euphrates and along the lower reaches of the River Balikh, the RCP 438 team recognised five pre-Holocene Quaternary fluvial (or Qf) formations, the oldest being two sets of high level gravel exposures, possibly pre-Pleistocene or early Pleistocene in date (Besançon and Sanlaville 1981, 12, Besançon and Geyer, 2003, 56, Sanlaville, 2004, 123). These high level gravels are post-dated, in chronological order, by three Pleistocene formations; the Chnine/Halabiyeh (Qf III), the Ain Abou Jemaa (Qf II) and the Abu Chahri (Qf I) formations (Besançon *et al.* 1980a Besançon and Sanlaville 1981, Besançon and Geyer 2003, Sanlaville 2004, Copeland 2004). Except at the type-site located near the confluence between the main river and the Balikh, deposits of the Chnine/Halabiyeh (Qf III) formation proved difficult to distinguish from both the high level gravels found in the area, as well from later Pleistocene fluvial deposits (Besançon *et al.* 1980a 170, Copeland 2004, 25). This confusion resulted in a number of exposures, originally assigned to the Qf II formation subsequently being reassigned to the Qf III formation (Copeland 2004, 33).

The Qf II deposits form the most well developed Pleistocene formation along the Raqqa to Abu Kemal stretch of the Euphrates, extensive deposits being recorded at Ain Abu Jemaa, Hamadine, Kasra and downstream of both Maadan and Tibni (Besançon *et al.* 1980a 167). The deposits at these localities were frequently seen to consist of two members; a lower gravel containing material whose lithology indicates a point of origin in the Taurus Mountains of Anatolia, and an upper aggradation consisting of calcareous material in a red silty matrix (Besançon and Geyer 2003, 36, Sanlaville 2004, 118). Notably, these Qf II deposits seem to form part of an extensive stacked sequence for, not only are the exposures themselves some ~20-30 m in height, with their base ~20 m above the modern floodplain (Besançon and Sanlaville 1981, 10, Sanlaville 2004, 128), their deposition was preceded by a phase of downcutting which extended some ~15-20 m below the current floodplain of the modern Euphrates (Sanlaville 2004, 118). Below the level of the Qf II formation, deposits assigned to the Qf I formation were found to be particularly well developed at Abu Chahri where, having been cut through by a wadi, they were exposed in section (Besançon and Sanlaville 1981, 9, Copeland 2004, 28). Here ~15 m of fluvial material comprising three superimposed units consisting of sandy gravel, overlain by beige silts, capped by gravels in a red silt matrix, was recorded (Besançon and Sanlaville 1981, 9).

The RCP 438 team subsequently recognised a similar Quaternary terrace sequence upstream between Jerablus and Qara Qozaq, and along the Sajour. In the main valley the earliest fluvial deposits to be recognised in this region consist of possible Pliocene gravels found at Chioukh Faouqani (Besançon *et al.* 1980b 5), whilst the oldest material identified along the Sajour consists of widespread sheets of (possible Pliocene/early Pleistocene) gravel exposed on a plateau located some ~50 m above the river at Qara Yaaqoub (Besançon *et al.* 1980b 3, Besançon and Sanlaville 1981, 16, Sanlaville, 2004, 117). In addition, slightly younger fluvial material was noted in a quarry opened in the valley of Wadi Sabounieh, a tributary of the Sajour (Besançon *et al.* 1980b 3, Copeland 2004, 25).

			Euphrates Quaternary Deposits		
	Age (MA)	Marine Isotope Stage	Besançon and Geyer (2003)	Sanlaville (2004)	Demir *et al.* (2007a)
Holocene		1	Qf 0	Qf 0	
Upper Pleistocene	0.01	2	Abu Chahri upper (Qf Ic)		
	0.03	3		Abu Chahri (Qf Ib)	
	0.06	4	Abu Chahri middle (Qf Ib)		
	0.07	5			
Middle Pleistocene	0.13	6	Abu Chahri lower (Qf Ia)	Abu Chahri (Qf Ia)	
	0.19	7			
	0.24	8	Abou Jemaa formation (Qf II)	Abou Jemaa formation (Qf II)	
	0.30	9			
	0.33	10			
	0.37	11	Halabiyeh (Qf III)		
	0.43	12			Ayash (Qf I)
	0.48	13			
	0.53	14		Chnine formation (Qf III)	
	0.57	15			
	0.62	16	?Chnine (Qf III)	Wadi Sabounieh	
	0.66	17			
	0.68	18		Qara Yaaqoub	
Lower Pleistocene	0.71				
	0.85	22			Abou Jemaa / Tibni (Qf II)
	0.88				
	1.17	36			
	1.20				
Pliocene					Zalabiyeh (Qf III)
	2.12				Halabiyeh lower gravel (Qf III)
	2.68				Halabiyeh upper gravel (Qf III)
	~3.1				

Table 7.3.2 Recent chronostratigraphic frameworks proposed for Quaternary deposits in the Euphrates Valley, Syria.

As was the case downstream, three Pleistocene fluvial formations (Qf III, Qf II and Qf I) were recognised along the upper reaches of the Syrian Euphrates and the Sajour. However, the Qf III formation was only recorded in the form of scattered remnants located along the Euphrates Valley north of Chioukh Faouqani (Besançon *et al.* 1980b 5) and as an eroded bench in the valley of the Sajour (Besançon *et al.* 1980b 3, Copeland 2004, 27, Sanlaville 2004, 118). In contrast, Qf II deposits were found to be well represented in both the valley of the Euphrates and that of the Sajour. As is the case further downstream, the Qf II exposures found in the main valley were frequently noted to consist of a lower gravel containing Tauric elements, surmounted by silty deposits (Besançon *et al.* 1980b 5, Besançon and Sanlaville 1981, 14). Additionally, the Qf II exposures recorded on the Euphrates in this area, like the corresponding deposits found downstream, tend to be substantial; at Jaada, for instance, some ~30 m of Qf II deposits were recorded (Besançon and Sanlaville 1981, 14). Below the level of the Qf II formation, conglomerate assigned to the Qf I aggradation was recorded in both the Euphrates Valley, and along the Sajour (Besançon and Sanlaville 1981, 14, Copeland 2004, 29).

Due to the fact that the research carried out by the RCP 438 team formed part of a wider programme of study of the Pleistocene geology and archaeology of Syrian rivers (see section 7.2), this chronostratigraphic sequence for the Pleistocene fluvial deposits of the Euphrates has been repeatedly modified, formations (in particularly those belonging to the Qf I formation) being split, in order to correct apparent anomalies and to accommodate the sequence within the Marine Isotope Stage (MIS) curve. The most recent interpretations of the sequence (Besançon and Geyer 2003, 56, Sanlaville 2004, 123) are outlined in table 7.3.2. However, it should be noted that the authors themselves acknowledge that, due to the total absence of paleontological data or any chronometric dates, the absolute chronology they suggest for the terrace formations is loose and, to some extent, hypothetical (Besançon and Geyer 2003, 55, Sanlaville 2004, 123).

Chronometric techniques have, however, recently been applied to deposits within the catchment of the Syrian Euphrates, in an initial attempt to fix particular points within the proposed terrace sequence. Ar-Ar dating has been used to provide an age estimate for basalt flows capping fluvial gravels at three localities on the Halabiyeh to Deir ez-Zor stretch of the Euphrates (Demir *et al.* 2007b). Samples of basalts found at Halabiyeh and Zalabiyeh, which overlie gravels assigned by the RCP 438 team to their Qf III formation, produced dates of 2717±20 kyr and 2116±39 kyr, while a further sample recovered from a volcanic flow at Ayash, which surmounts gravels assigned by the RCP workers to their Qf I formation, provided an age of 402±11 kyr. This data suggests that the gravels at these locales are considerably older than has been previous thought (see table 7.3.2). Futhermore, following the assertion that terrace formation along the Euphrates is a result of cyclic climatic triggering in response to localised deformation of the earth's crust, resulting in regional uplift (Demir *et al.* 2007b, 4; see chapter four, section 4.2), the same authors have used these dates, in conjunction with local surface uplift modelling, to suggest MIS attributions of fluvial gravels found in the Halabiyeh to Deir ez-Zor region (see figure 7.3.1 and table 7.3.2).

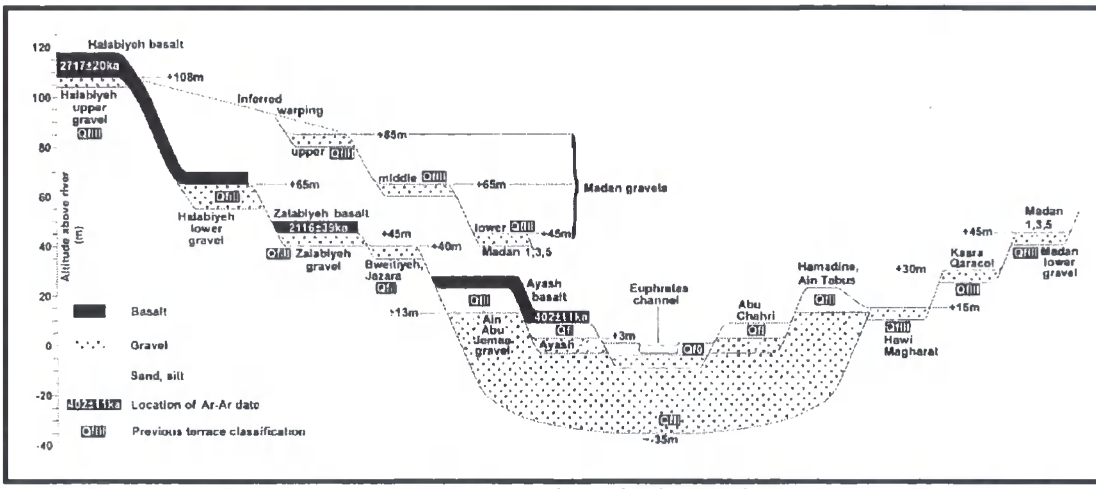

Figure 7.3.1. Schematic transverse section through the Euphrates terraces located between Maadan and Deir ez-Zor, including the position of dated basalt flows and associated Ar-Ar age estimates (after Demir et al. 2007b).

Although this data suggests that fluvial deposits found along the stretch of the Euphrates between Halabiyeh and Deir ez-Zor accumulated considerably earlier than previously thought, it does not necessarily follow that deposits assigned to the same formation elsewhere on the Euphrates were deposited at similar dates. Indeed, Demir *et al.* (2007a, 23) suggest that terrace deposits found towards the Syrian/Turkish border may have aggraded at a considerably later period than those assigned to the same Quaternary formation downstream. Underlying this contention is the suggestion that the rate of fluvial incision, a proxy for surface uplift (which the authors argue is responsible for terrace formation - see above), appears to have been greater upstream than downstream on the Syrian Euphrates. This, it is argued, is supported by the fact that fluvial deposits have been found up to ~200 m above the modern river near the Turkish/Syrian border, while the highest point at which they have been recorded downstream in the Raqqa to Deir ez-Zor region is ~110 m above the modern Euphrates (Demir *et al.* 2007b 23). In addition, it is suggested that this interpretation is further supported by the fact that Qf III and Qf II deposits around Raqqa are found at up to ~65 m and ~30 m above the modern river, while downstream between Halabiyeh and Deir ez-Zor they reach up to ~45 m and ~20 m respectively. On this basis, it has been tentatively suggested that, while the Qf II gravels found between Halabiyeh and Deir ez-Zor accumulated between MIS 36 and MIS 22, this phase of deposition is marked by the emplacement of Qf III deposits towards, and upstream of, the Turkish/Syrian border (Demir *et al.* 2007b, 23).

As a result of this recent work, it is now possible to advance firmer, if broad, MIS attributions for some fluvial deposits of the Syrian Euphrates which have produced archaeological material. However, the dating of many deposits still remains extremely tentative. Specific information regarding the preferred age attributions of the earlier Palaeolithic assemblages from the Euphrates Valley selected for study are discussed in the relevant chapter sections.

Chapter 8
The Earlier Palaeolithic of the Euphrates Valley – Lower Palaeolithic Sites

8.1 Introduction

The assemblages presented in this chapter are all considered to be Lower Palaeolithic in date (based on the criteria outlined in chapter three). All have been obtained from stratified contexts broadly attributable to MIS 8 or earlier. In contrast to the Orontes Valley, however, there is little Lower Palaeolithic material from primary context sites. Consequently, most of the material considered in this chapter consists of collections which are clearly fluvially derived. Therefore, rather than focusing on human behaviour at particular points in the landscape, the main purpose of studying this material is to gain insights into earlier hominin technological practices in the Euphrates Valley as a whole. In order to achieve this assemblages have been selected from points situated along a large stretch of the Syrian Euphrates and its tributaries (see figure 8.1.1).

In total, six separate assemblages are discussed in detail in this chapter. Most comprise relatively large collections of fluvially abraded material, and have been selected for study on the basis of collection size. Those presented have the greatest potential for reflecting the lithic material produced and discarded in the Euphrates Valley, because they are the largest such samples available. Only a single site (Halouanndji IV) has produced any minimally reworked material which reflects hominin technological decision making and landuse practices at a particular point in the landscape. Two small collections of fluvially abraded material have also been studied (Maadan 1 and 5). They are included as they are suggested to be particularly ancient, and are therefore important when discussing the early human settlement history of the region.

The material discussed in this chapter is presented in much the same manner as previously. Each assemblage is considered separately, although individual exceptions have been made. The geological and chronostratigraphic contexts of the assemblages are presented before a taphonomic analysis of the collection; this is necessary to assess whether any portion of the assemblage indicates lithic working at the findspot, or whether the collection is simply representative of such practices in the wider area. A detailed technological study of each collection then follows. This is used as the basis for an assessment of hominin technological behaviour and, where possible, landuse. Finally, the information from each assemblage is collated and an assessment of Lower Palaeolithic settlement history, technological practices and landscape-use in the Euphrates Valley in Syria is offered.

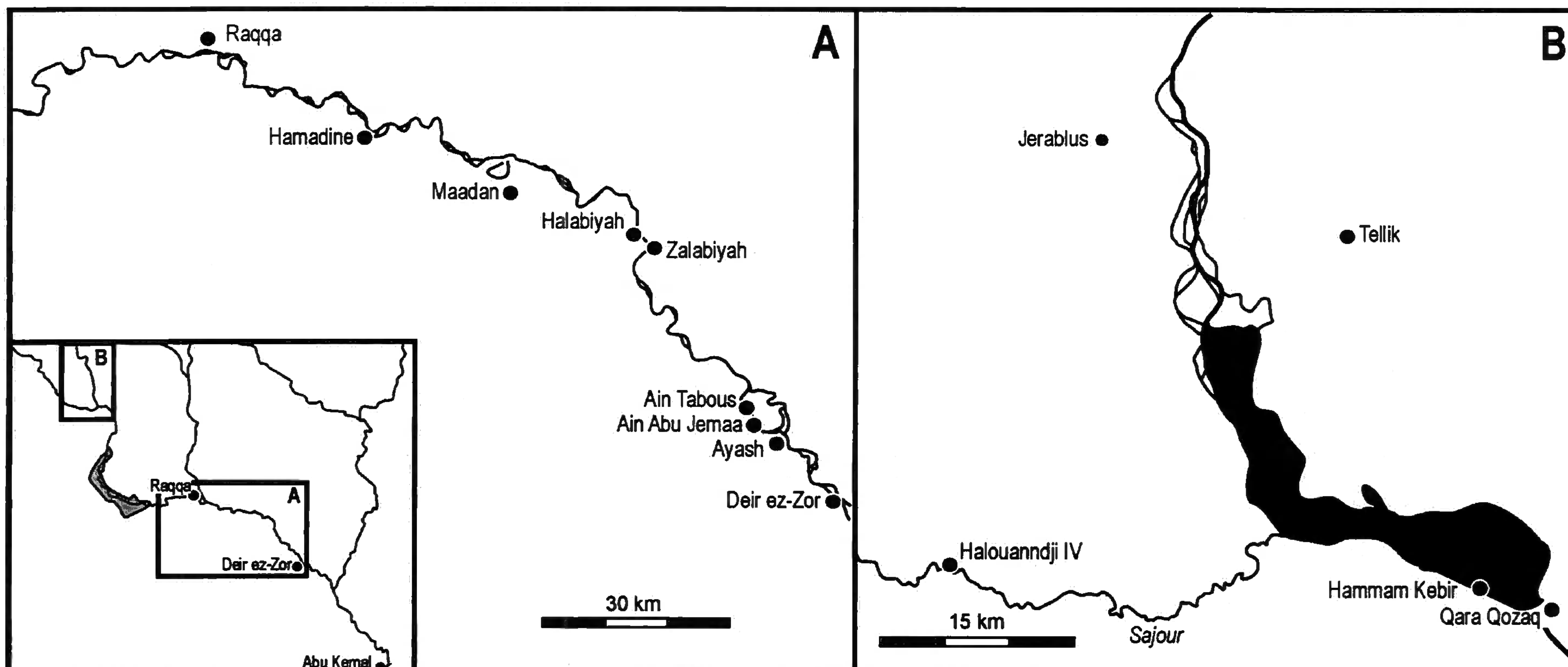

Figure 8.1.1 *Location map showing the position all sites referred to in chapter 8.*

8.2 Maadan 1 and 5

Location & History of Investigation

During the 1978 RCP 438 survey of the Pleistocene geology and archaeology of the Syrian Euphrates (see chapter seven, section 7.2), artefact-bearing Pleistocene fluvial deposits were noted on the edge of the plateau overlooking the village of Maadan (located ~55 km south-east of Raqqa), as well as along the lower course of the nearby Wadi Khnaifess (Besançon *et al.* 1980b, 168, Besançon and Sanlaville 1981, 11; see figure 8.2.1). Three small collections of stone tools (Maadan 1, 3 and 5) were made from terrace gravels exposed in quarry sections located ~2-3 km south-east of Maadan village, near to a point at which the Wadi Khnaifess fans out (Copeland 2004, 26). Recently researchers (Demir *et al.* 2007b, 13) revisited other fluvial gravels (site 4b and 4a) previously recorded by the RCP 438 team south-east of the artefact findspots (see figure 8.2.1); these deposits have not produced any artefacts.

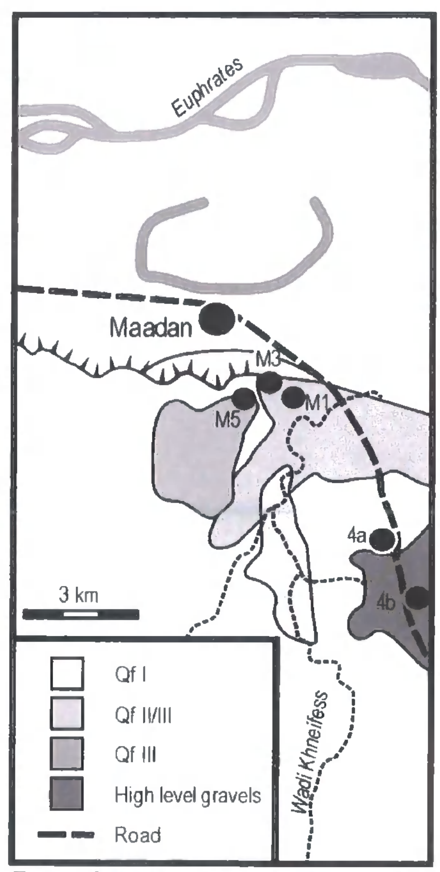

Figure 8.2.1 Map showing the relative position of Pleistocene fluvial exposures in the Maadan area; M1=Maadan 1, M3 = Maadan 3, M5 = Maadan 5.

Geological Background & Preferred Dating

In their various publications, the RCP 438 team consistently record fluvial deposits assigned to their Qf III, Qf II and Qf I formations south-east of Maadan and along the Wadi Khnaifess (Besançon *et al.* 1980b, 168, Besançon and Sanlaville 1981, 11, Sanlaville 2004, 131; see chapter seven, section 7.3 for an explanation of terrace nomenclature). However, the particular terrace attribution of two of the three implementiferous exposures found in the area has been subject to revision. The deposits associated with the artefacts from Maadan 5 have been consistently assigned to the Qf III formation (Hours 1981, 180, Copeland 2004, 26). However, those associated with the Maadan 1 collection have only recently been reclassified as Qf III deposits (Copeland 2004, 26), having been previously assigned to the Qf II formation (Hours 1981, 181). Further confusion exists in the case of Maadan 3, as not only have the deposits from here been reattributed to the Qf III formation (Copeland 2004, 26), having previously been assigned to the Qf II formation (Hours 1981, 181), but the same location is described as possessing Qf I deposits cut into a Qf II "remnant" (Copeland 2004, 29).

It does, however, seem clear that the artefact bearing deposits at Maadan post-date the other gravels recently found to the south-east at sites 4b and 4a (Demir *et al.* 2007b, 13). This is because, whilst the surface of the fluvial deposits found at sites 4b and 4a are located ~65 m and ~85 m above the modern Euphrates, comparison between the extent of the gravels mapped by the RCP 438 team in the area where the Maadan 1, 3 and 5 artefact collections were recovered, and Shuttle Radar Topographic Mission (SRTM) data, suggests that that the gravels here only reach ~45-50 m above the modern river (Demir *et al.* 2007b, 13).

Notably, Demir *et al.* (2007b, 14) conclude that, since the gravels associated with the Maadan 1, 3 and 5 artefacts may be at a broadly similar height to the gravels at Zalabiyeh, the two deposits are of comparable age. Consequently, because the Zalabiyeh gravels are capped with basalt recently dated to 2116±39 kya (see chapter seven, section 7.3), they argue that the stone tools from Maadan 1, 3 and 5 are ~2 million years old (Demir *et al.* 2007b, 14). If correct, not only would this suggest that the Maadan 1, 3 and 5 artefacts represent some of the earliest evidence for a human presence along the Euphrates, but also outside of Africa. However, several factors suggest that this claim should be treated with caution.

A major problem with the suggestion that the Maadan 1, 3 and 5 gravels can be correlated with those at Zalabiyeh lies in the fact that Demir *et al.* (2007b) do not establish their exact location. Consequently, it is debatable whether taking the heights of the surface of the gravels in the general vicinity of these findspots from SRTM imagery provides an accurate estimate of the altitude of the deposits at the specific localities from which the artefacts were recovered. This is a particular problem as Qf III, Qf II and Qf I deposits have all been mapped in close proximity to each other in this region (Besançon and Sanlaville 1981, 11; see figure 8.2.1). However, perhaps an even more fundamental problem is that even if these heights were correct, Demir *et al.* (2007b, 23) themselves point out that differential rates of fluvial incision seem to have occurred along the course of the Euphrates, with the result that gravels found upstream may be considerably younger than deposits found at the same height downstream (see chapter seven, section 7.3). Consequently, as the Maadan sites are located ~25 km upstream of Zalabiyeh, the suggestion that the surface of the fluvial deposits at the two locales are at the same height above the Euphrates may actually indicate that the Maadan gravels aggraded after those at Zalabiyeh.

As a result of these problems, the following approach has been taken regarding the dating of the Maadan 1, 3 and 5 artefact collections. Due to confusion regarding the context of the Maadan 3 material, this site has been excluded from further consideration. As the Maadan 5 material is from Qf III deposits of the Euphrates, while Maadan 1 is from Qf III *or* Qf II deposits, it would seem that these gravels are at least as old, and possibly older, than other Qf II exposures found in this region. As recent research suggests that Qf II deposits located along this stretch of the Euphrates aggraded between MIS 36 (1.20-1.17 mya) and 22 (0.88-0.85 mya; see chapter seven, section 7.3), the gravels associated with the Maadan 1 and 5 artefacts probably accumulated during this period, or maybe even at a slightly earlier date. As such, although the material may not represent evidence for a very early hominin presence outside Africa, the Maadan 1 and 5 artefacts do seem to broadly relate to the earliest known period of human occupation in the Near East.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Maadan 1		Maadan 5	
	No. of artefacts	% of total	No. of artefacts	% of total
Cores	25	36.2%	1	16.7%
Handaxes	0	0.0%	0	0.0%
Flakes	44	63.8%	5	83.3%
Flake tools	0	0.0%	0	0.0%
Total	56	100%	6	100.0%

Table 8.2.1 Material analysed from Maadan 1 and Maadan 5.

Because of unresolved questions regarding the context of the Maadan 3 artefacts (see above), analysis has solely focussed on material housed in the National Museum, Damascus that is clearly labelled as originating from the gravels at Maadan 1 and 5 (see table 8.2.1). Due to the small size of the Maadan 5 assemblage (6 artefacts) and the fact that the two collections could have been incorporated into the fluvial deposits with which they are associated over a considerable period of time (see above), the two samples have been considered here as a combined assemblage.

Taphonomy of lithic assemblage

Cores from Maadan 1 and Maadan 5 (n=26)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	0	0.0%
Moderately abraded	0	0.0%	*Moderate edge damage*	17	65.4%
Heavily abraded	26	100.0%	*Heavy edge damage*	9	34.6%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	0	0.0%	*Lightly patinated*	0	0.0%
Moderately stained	1	3.8%	*Moderately patinated*	19	73.1%
Heavily stained	25	96.2%	*Heavily patinated*	7	26.9%
No battering	0	0.0%			
Light battering	0	0.0%			
Moderate battering	25	96.2%			
Heavy battering	1	3.8%			

Table 8.2.2 Condition of all cores from Maadan 1 and Maadan 5.

Flakes from Maadan 1 and Maadan 5 (n=49)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	0	0.0%
Moderately abraded	4	8.2%	*Moderate edge damage*	27	55.1%
Heavily abraded	45	91.8%	*Heavy edge damage*	22	44.9%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	1	2.0%	*Lightly patinated*	0	0.0%
Moderately stained	4	8.2%	*Moderately patinated*	35	71.4%
Heavily stained	44	89.8%	*Heavily patinated*	14	28.6%
No battering	0	0.0%			
Light battering	0	0.0%			
Moderate battering	49	100.0%			
Heavy battering	0	0.0%			

Table 8.2.3 Condition of all flakes from Maadan 1 and Maadan 5.

All the artefacts from Maadan 1 and 5 display evidence of surface modification characteristic of extensive fluvial reworking, including at least moderate levels of abrasion, edge damage and battering (see tables 8.2.2 and 8.2.3). Because of this, and the dating evidence outlined above, the two collections are considered here to represent material from a broad landscape catchment that accumulated at any point (or points) no later than the time period represented by MIS 22 (0.88-0.85 mya), and probably no earlier than MIS 36 (1.20-1.17 mya).

Technology of lithic assemblage

Raw Material

All the artefacts from Maadan 1 and 5 are on coarse-grained chert/flint. Unfortunately, due to the post-depositional fluvial reworking the material has suffered, it is not possible to use the state of the cortex on the artefacts to suggest the source of this raw material. However, it is notable that the only bedrock source of chert/flint found in the Euphrates Valley is found amongst Upper Cretaceous exposures located east of Tellik village, some ~150 km upstream of Maadan (see figure 8.2.1), whilst the nearest source outside the Euphrates Valley is located some ~65 km to the south-west in the Jebal Al-Bishri (Ponikarov *et al.* 1966, 30; 1967, 67). This, in conjunction with the observation that all but one of the cores studied were produced on a rounded cobble (personal observation), suggests that the raw material used to produce the artefacts from Maadan 1 and 5 was obtained from river gravels.

Core Working

	Maximum dimensions (mm)	Weight (grams)
Mean	81.4	335.0
Median	75.2	270.5
Min	47.9	88.0
Max	151.2	1048.0
St.Dev.	26.2	242.4

Table 8.2.4 Maadan 1 and Maadan 5 cores summary statistics (n=26)

Cores; technological observations (n=26)					
Overall core reduction (n=26)			Core episodes (n=39)		
Migrating platform	24	92.3 %	*Type A: Single Removal*	3	7.7%
Single platform unprepared	2	7.7 %	*Type B: Parallel flaking*	6	15.4%
Opposed platform unprepared	0	0.0%	*Type C: Alternate flaking*	26	66.7%
Discoidal	0	0.0%	*Type D: Un-attributed removal*	4	10.3%
Fragment	0	0.0%			
Flake scars/core (n=26)			Core episodes/core		
1-5	12	48.0%	*Min*	1	-
6-10	10	40.0%	*Max*	3	-
>10	3	12.0%	*Mean*	1.5	-
Max	14	-			
Mean	6.1	-	Flake scars/core episode		
			Min	1	-
			Max	14	-
% Cortex (n=26)			*Mean*	3.9	-
0	1	3.8%			
>0-25%	2	7.7%	Blank form retained? (n=26)		
>25-50%	9	34.6%	*Yes*	25	96.2%
>50-75%	13	50.0%	*No*	1	3.8%
>75%	1	3.8%			

Table 8.2.5 Technological observations for cores from Maadan 1 and Maadan 5 (one core is too abraded to allow accurate counts of the number of flake scars or core episodes present).

The cores from Maadan 1 and 5 tend to be medium-sized, with an average maximum dimension of 81.4 mm and an average weight of 335.0 grams (table 8.2.4). Their technological attributes are summarized in table 8.2.5. The assemblage is dominated by migrating platform cores (92.3%) characterised by the exploitation of platforms on an *ad hoc* basis as they presented themselves throughout reduction. Flaking of the cores is typified by a very restricted number of episodes (average = 1.5) of alternate flaking (66.7%), each of which involved an average of 3.9 removals. Reduction does not seem to have been prolonged, as only three of the cores possess more than 10 scars, while nearly half (48.0%) retain five or less. The impression that the Maadan cores tended to be discarded after a few (frequently a single) short episodes of flaking is reinforced by the high levels of cortex rentention recorded, with 53.8% possessing cortex on over 50% of their surface area.

Generally, working of the Maadan cores seems to have followed a similar pattern to that adopted at Lower Palaeolithic sites in the Orontes Valley (see chapter five), in that it was geared towards the production of large/medium-sized flakes. Futhermore, the reduction intensity of the Maadan cores is equivalent to that observed at Rastan on the Orontes (see chapter five, section 5.3). At Rastan, cores were not extensively worked because small river cobbles were used. This is notable because although the river cobbles used to produce the Maadan 1 and 5 cores were undoubtedly larger than those worked at Rastan, their form (rounded cobbles) may also have impacted on the intensity of working; a significant number seem to have allowed for only limited reduction. When discarded, they had already reached a point beyond which no more viable flaking angles could be exploited (personal observation; this fact was also noted by Francis Hours - see Copeland 2004, 34).

Handaxes

No handaxes were identified amongst the material studied from Maadan 1 and 5, although, given the small size of the assemblages little significance can be attached to this fact.

Flakes

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	63.4	53.0	22.8
Median	62.7	47.8	20.5
Min	27.7	30.3	7.3
Max	96.6	120.8	52.3
St.Dev.	15.4	20.2	9.5

Table 8.2.6 Maadan 1 and Maadan 5 flakes summary statistics (n=41, fragments excluded)

The flakes from Maadan 1 and 5 are medium-sized and thick (see table 8.2.6). This probably results in part from the fact that all display evidence of significant fluvial abrasion (table 8.2.3), which would cause smaller, thinner flakes to break up. A bias towards the recovery of larger flakes probably also contributed to this pattern, since the artefacts were collected as grab samples. Having said this, the morphology of the flakes studied is also compatible with them having been removed from medium-sized rounded river cobbles, similar to those used to produce the cores found at the site.

Flakes; technological observations (n=49)					
Portion (n=49)			Dorsal scars (n=41)		
Whole	41	83.7%	0	8	19.5%
Proximal	3	6.1%	1	15	36.6%
Distal	2	4.1%	2	9	22.0%
Mesial	0	0.0%	3	6	14.6%
Siret	3	6.1%	4	2	4.9%
			5	1	2.4%
			>5	0	0.0%
Dorsal cortex retention (n=41)			Dorsal scar pattern (n=41)		
100%	8	19.5%	*Uni-directional*	27	65.9%
>50%	7	17.1%	*Bi-directional*	1	2.4%
<50%	18	43.9%	*Multi-directional*	5	12.2%
0%	8	19.5%	*Wholly cortical*	8	19.5%
Butt type (n=49)			Hammer mode (n=49)		
Plain	20	40.8%	*Hard*	49	100%
Cortical	19	38.8%	*Soft*	0	0.0%
Obscured	7	14.3%	*Indeterminate*	0	0.0%
Missing	3	6.1%			
			Relict core edge(s) (n=41)		
			Yes	13	31.7%
			No	28	68.3%

Table 8.2.7 Technological observations for flakes from Maadan 1 and Maadan 5.

The taphonomic histories of the collections from Maadan 1 and 5 are also likely to have had a major impact on the technological observations made for the flake assemblages (table 8.2.7). For instance, these factors may be responsible for the total absence of soft hammer flakes in the collections studied (table 8.2.7). However, the flake data does allow some meaningful technological observations to be made. The observation that the flakes from Maadan 1 and 5 tend to retain some cortex on their dorsal surface (80.5%) and low scar counts (92.7% possess three scars or less) suggests that they are the product of short knapping sequences involving few removals. In addition, the fact that the flakes tend to possess an uncomplicated dorsal scar pattern (65.9% possess a unidirectional dorsal scar pattern) suggests that the reduction strategies employed by the Maadan knappers involved little core rotation, and a limited number of platform changes. Thus, the flake data for the selected samples from Maadan compliments observations made for the cores from the sites, in as much as both artefact categories seem to be the product of a curtailed reduction strategy applied to the working of medium-sized river cobbles.

Retouched Tools

No retouched artefacts were identified amongst the material studied from Maadan 1 and 5.

Technology and Hominin Behaviour

The material recovered from Maadan 1 and 5 constitutes two small, fluvially reworked assemblages. The artefacts reflect hominin practices on a broad scale within a wide catchment, and cannot be related to ethnographic-scale questions concerning specific technological actions. Indeed, their main interest lies in the fact that they potentially represent the earliest evidence for a hominin presence in the region (i.e. at some point before 0.85 mya, but probably not much earlier than 1.20 mya). Having said this, some significant observations relating to the material from the sites can be made. In particular, it seems that the cores from Maadan 1 and 5 result from similar approaches to working as previously observed for Lower Palaeolithic assemblages in the Orontes Valley. Namely, once medium sized flakes could no longer be produced, the cores were abandoned. In the case of the Maadan cores it is arguable that, to some degree, this picture results from the fact that the form of the blanks available to the knappers only allowed for working of limited intensity. This is illustrated by the fact that many of these cores retained no viable angles for productive flaking by the time they were discarded.

8.3 Ain Abu Jemaa

Location & History of Investigation

The single largest collection of Lower Palaeolithic artefacts (n=450) recovered from the Euphrates Valley in Syria was obtained from gravels found at Ain Abu Jemaa, located ~25 km north-west of Deir ez-Zor (see figure 8.1.1). The assemblage, collected during the course of the 1978 RCP 438 survey of the region (see chapter seven, section 7.2), was recovered from a section exposed in a large gravel quarry (Copeland 2004, 27).

Geological Background & Preferred Dating

The fluvial deposits exposed at Ain Abu Jemaa form the stratotype for the RCP 438 team's Qf II Pleistocene fluvial formation along the middle course of the Syrian Euphrates. They consist of a lower coarse gravel, surmounted by sands and silts (Besançon and Geyer 2003, 58, Sanlaville 2004, 117). It is unclear where exactly within this sequence the artefacts from Ain Abu Jemaa were recovered from, but the fact that they have been heavily reworked (see below) suggests that they were probably obtained from the lower gravels.

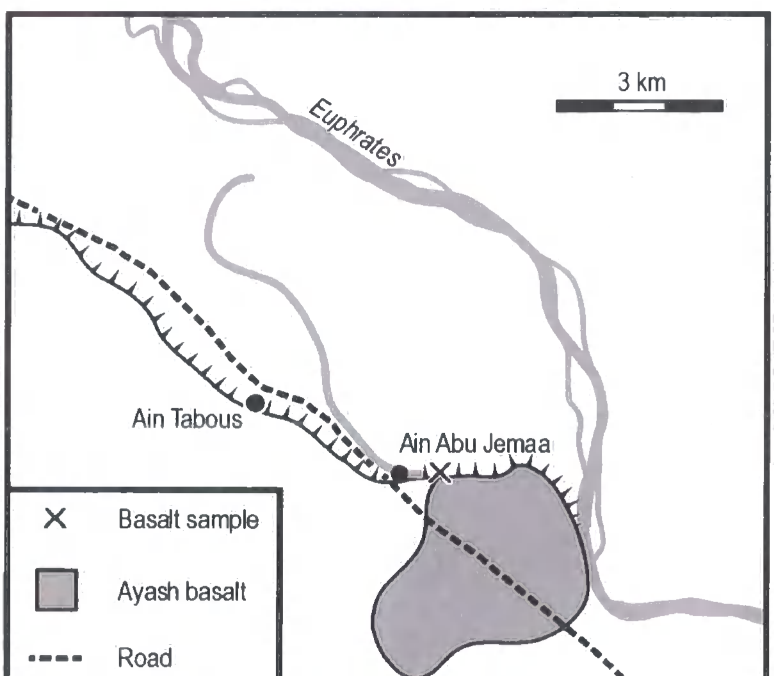

Figure 8.3.1 Location map illustrating the position of the Pleistocene fluvial deposits at Ain Abu Jemaa and Ain Tabous, and the Ayash basalt.

Notably, the deposits at Ain Abu Jemaa are located immediately upstream from Ayash where Qf I deposits overlain by basalt have been recorded (Besançon and Geyer 2003, 41; see figure 8.3.1). A sample of this basalt has recently been dated to 402±11 kya (see Section 5.3), indicating that the Qf I gravels at Ayash aggraded at least as long ago as MIS 12, suggesting that the Qf II deposits at Ain Abu Jemaa accumulated prior to this date (Demir *et* *al.* 2007b, 12). However, given that the Qf II deposits along this stretch of the Euphrates appear to form part of an extensive, stacked sequence of fluvial deposits (see section 5.3), the Ain Abu Jemaa gravels may have accumulated at any point over a considerable period of time. Uplift modelling based around dates obtained for basalt flows capping a number of terrace deposits in the same region of the Euphrates (see chapter seven, section 7.3) has recently (Demir *et al.* 2007b, 24) been used to suggest that this period stretched from MIS 36 (1.20-1.17 mya), to MIS 22 (0.88-0.85 mya).

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Ain Abu Jemaa	
	No. of artefacts	**% of total**
Non-Levallois cores	81	22.8%
Simple prepared cores	3	0.8%
Handaxes	10	2.8%
Flakes	260	73.2%
Flake tools	1	0.3%
Total	355	100%

Table 8.3.1 Material analysed from Ain Abu Jemaa.

A total of 355 artefacts recovered from Ain Abu Jemaa have been studied (see table 8.3.1). All are stored in the National Museum, Damascus and are clearly labelled as having been recovered from the deposits exposed at the site.

Taphonomy of lithic assemblages

Cores from Ain Abu Jemaa (n=84)					
Unabraded	1	1.2%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	1	1.2%
Moderately abraded	6	7.1%	*Moderate edge damage*	22	26.2%
Heavily abraded	77	91.7%	*Heavy edge damage*	61	72.6%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	8	9.5%	*Lightly patinated*	1	1.2%
Moderately stained	16	19.0%	*Moderately patinated*	62	73.8%
Heavily stained	60	71.4%	*Heavily patinated*	21	25.0%
No battering	12	14.3%			
Light battering	18	21.4%			
Moderate battering	42	50.0%			
Heavy battering	12	14.3%			

Table 8.3.2 Condition of all cores from Ain Abu Jemaa.

In terms of condition, nearly all the artefacts studied from Ain Abu Jemaa share broadly similar physical attributes (see tables 8.3.3, 8.3.4 and 8.3.5). However, there is one major exception to this observation; a single core which, unlike all the other artefacts from the site, is unabraded and only lightly edge damaged. The fact that it is the only artefact studied from the collection which does not display any sign of fluvial modification raises the possibility that it is an intrusive element that was not originally associated with Ain Abu Jemaa gravels. Consequently, this core has been excluded from further analysis. All the remaining artefacts display evidence of surface modification characteristic of extensive fluvial reworking, including at least moderate levels of abrasion and edge damage. Because of this, the collection is considered here to represent material from a broad landscape catchment that became incorporated into the fluvial deposits found at the site during the time period between MIS 36 and MIS 22 (see above).

Handaxes from Ain Abu Jemaa (n=10)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	0	0.0%
Moderately abraded	2	20.0%	*Moderate edge damage*	2	20.0%
Heavily abraded	8	80.0%	*Heavy edge damage*	8	80.0%
Unstained	1	10.0%	*Unpatinated*	0	0.0%
Lightly stained	0	0.0%	*Lightly patinated*	0	0.0%
Moderately stained	3	30.0%	*Moderately patinated*	7	70.0%
Heavily stained	6	60.0%	*Heavily patinated*	3	30.0%
No battering	2	20.0%			
Light battering	0	0.0%			
Moderate battering	6	60.0%			
Heavy battering	2	20.0%			

Table 8.3.3 Condition of all handaxes from Ain Abu Jemaa.

Flakes from Ain Abu Jemaa (n=261)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	3	1.1%	*Slight edge damage*	0	0.0%
Moderately abraded	19	7.3%	*Moderate edge damage*	57	21.8%
Heavily abraded	239	91.6%	*Heavy edge damage*	204	78.2%
Unstained	4	1.5%	*Unpatinated*	0	0.0%
Lightly stained	12	4.6%	*Lightly patinated*	2	0.8%
Moderately stained	28	10.7%	*Moderately patinated*	213	81.6%
Heavily stained	217	83.1%	*Heavily patinated*	46	17.6%
No battering	44	16.9%			
Light battering	79	30.3%			
Moderate battering	94	36.0%			
Heavy battering	44	16.9%			

Table 8.3.4 Condition of all flakes from Ain Abu Jemaa.

Technology of lithic assemblage

Raw Material

All the artefacts studied from Ain Abu Jemaa are produced on coarse-grained chert/flint. However, because the artefacts have been extensively fluvially abraded, the state of the cortex on these artefacts cannot be used to establish the source of this raw material. There is, however, some indications that they were produced on blanks obtained from river gravels - namely, the fact that Ain Abu Jemaa is located some ~90 km from the nearest primary source of chert/flint (located to the south outside of the Euphrates Valley in the Jebal al-Bishri; see Ponikarov *et al.* 1966, 30; 1967, 67).), and the observation that most of the handaxes (60.0%) and the cores (71.1%) from the site are produced on rounded cobbles (see table 8.3.5).

	Cores (n=83)	Handaxes (n=10)
Blank form		
Nodule (Rounded)	71.1%	60.0%
Nodule (Tabular)	0.0%	0.0%
Shattered Nodule	2.4%	0.0%
Flake	0.0%	0.0%
Thermal flake	0.0%	0.0%
Indeterminate	26.5%	40.0%

Table 8.3.5 Inferred blank form for cores and handaxes studied from Ain Abu Jemaa.

Core Working

	Maximum dimensions (mm)	Weight (grams)
Mean	82.3	329.0
Median	81.9	286.0
Min	50.4	50.9
Max	131.2	975
St.Dev.	16.4	194.8

Table 8.3.6 Ain Abu Jemaa cores summary statistics (n=80, fragments excluded).

Generally, the cores studied from Ain Abu Jemaa are medium-sized, with an average maximum dimension of 82.3 mm and an average weight of 329.0 grams (table 8.3.6). Their technological attributes are summarized in table 8.3.7. The collection is dominated by migrating platform cores (75.9%), which were exploited in an organic fashion, platforms shifting as they became available throughout reduction. Single platform cores on which flaking originates from one unprepared platform are also relatively common (15.7%). Notably, two of the cores from the site could be described as simple prepared core, in that they possesses all the features of Boëda's (1986, 1995) volumetric definition of Levallois flaking (see chapter three), but lack evidence for deliberate surface configuration. However, as fortuitous examples of such cores are found in assemblages datable to the Lower and Middle Pleistocene (White and Ashton 2003) the presence of these two cores amongst material from Ain Abu Jemaa is perhaps of limited significance (a similar example of such a core was found amongst the Lower Paleolithic material studied from Jrabiyat 2 in the Orontes Valley; see chapter five, section 5.6).

Cores; technological observations (n=83)					
Overall core reduction (n=113)			Core episodes (n=153)		
Migrating platform	63	75.9%	*Type A: Single Removal*	18	11.8%
Simple prepared	2	2.4%	*Type B: Parallel flaking*	17	11.1%
Single platform unprepared	13	15.7%	*Type C: Alternate flaking*	75	49.0%
Opposed platform unprepared	1	1.2%	*Type D: Un-attributed removal*	43	28.1%
Discoidal	1	1.2%			
Fragment	3	3.6%			
Flake scars/core (n=77)			Core episodes/core		
1-5	47	61.0%	*Min*	1	-
6-10	25	32.5%	*Max*	7	-
>10	5	6.5%	*Mean*	2.0	-
Max	13	-			
Mean	5.5	-	Flake scars/core episode		
			Min	1	-
			Max	9	-
% Cortex (n=78)			*Mean*	2.8	-
0	2	2.6%			
>0-25%	6	7.7%	Blank form retained? (n=78)		
>25-50%	27	34.6%	*Yes*	53	67.9%
>50-75%	41	52.6%	*No*	25	32.1%
>75%	2	2.6%			

Table 8.3.7 Technological observations for cores from Ain Abu Jemaa (note: one core is too abraded to allow accurate counts of flake scars, or core episodes).

The cores from Ain Abu Jemaa predominantly reflect a very restricted number of episodes (average = 2.0) of alternate flaking (49.0%), each of which involved an average of just 2.8 removals. Evidence that reduction was not prolonged is provided by the fact that only five of the cores possess more than 10 scars, while over half (61.0%) retain five or less. The suggestion that flaking at Ain Abu Jemaa involved a few, short episodes is supported by the large amounts of cortex that the cores retain, with 55.2% possessing cortex on >50% of their surface area. In addition, the majority also retain the form of the original blank, which was almost exclusively a rounded river cobble (see table 8.3.5). Working of the Ain Abu Jemaa cores therefore seems to have involved a curtailed knapping process similar to that observed at Maadan 1 and 5 (see section 8.2). Arguably, this similarity in core working practices is a reflection of the fact that all three assemblages are produced on rounded river cobbles of similar dimensions which did not allow for extensive reduction.

Handaxes

	Length (mm)	Breadth (mm)	Thickness (mm)
Jem 2952	123.6	80.7	48.3
Jem 2953	111.6	81.8	54.7
Jem 2956	98.0	61.0	28.1
Ain Abu Jemaa 2963	109.2	53.8	35.7
Jem 2961	115.9	69.2	48.5

Table 8.3.8 Ain Abu Jemaa handaxes summary statistics (n=5, fragments and roughouts excluded).

The handaxe assemblage from Ain Abu Jemaa consists of six whole artefacts (one of which is a roughout) and four fragments. The five complete examples are all medium-sized (see table 8.3.8), display relatively low levels of refinement (see figure 8.3.2) and can all be described as pointed ovates (see figure 8.3.3).

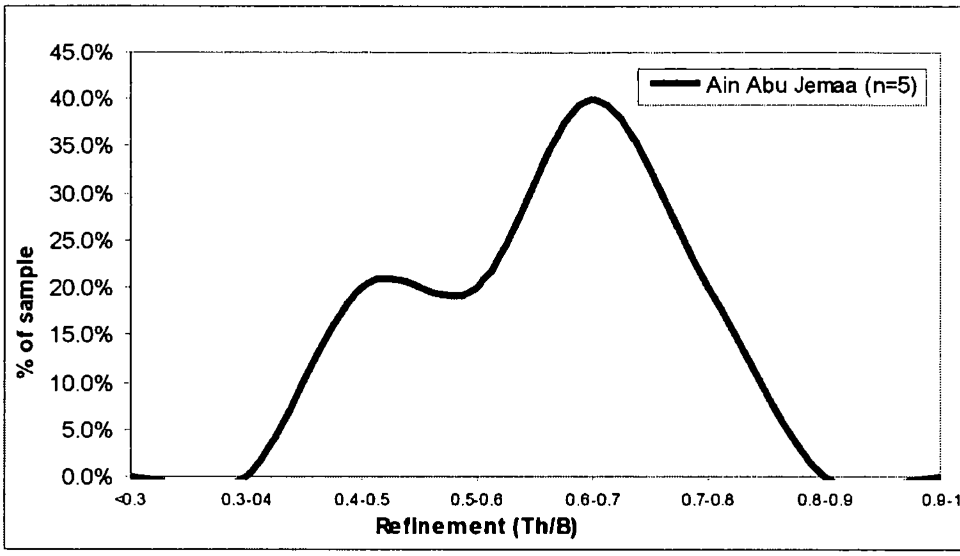

Figure 8.3.2 Levels of refinement for all whole handaxes studied from Ain Abu Jemaa.

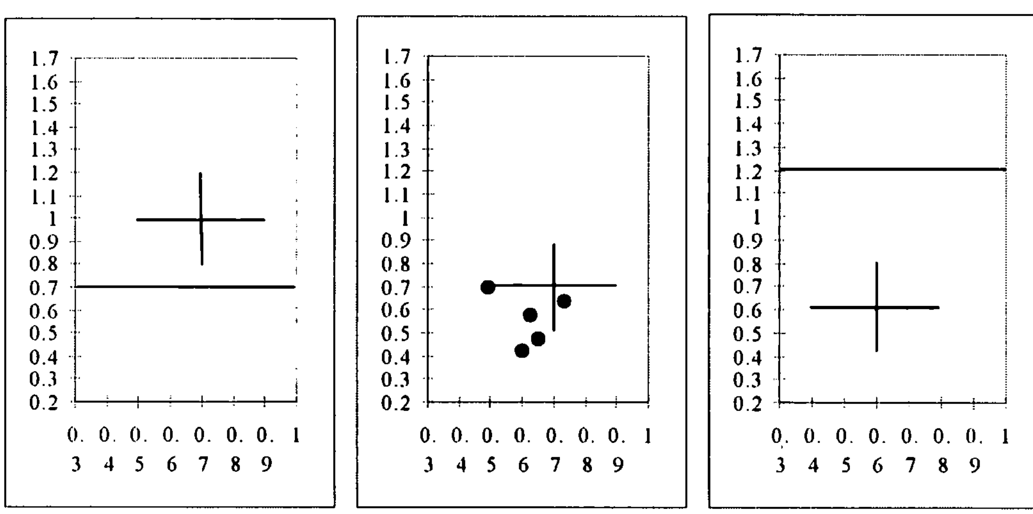

Figure 8.3.3 Tripartite diagrams for all whole handaxes studied from Ain Abu Jemaa (n=5).

The technological attributes of the Ain Abu Jemaa handaxes are summarized in table 8.3.9. In line with their generally low levels of refinement, scar counts on the handaxes from Ain Abu Jemaa are relatively low with an average of 12.6 scars greater than 5 mm being present. Futhermore, all of the complete handaxes in the collection studied retain cortex on >25% of their surface, while three of the five examples possess cortex on >50% of their total surface area. Cortex is either located all over the artefact, or restricted to the butt, none of which are worked. Unsurprisingly, given these high levels of cortex retention, all the complete handaxes studied retain the form of the original blank used in their production. A rounded river cobble was most frequently employed (see table 8.3.5). It was not, however, possible to determine whether a hard or soft hammer was used to produce the majority of the assemblage (80%), as most handaxes have been extensively transported and damaged by fluvial processes. A hard hammer was used to produce the two artefacts for which hammer mode could be determined.

Handaxes; technological observations (n=10)					
Portion (n=10)			Hammer mode (n=10)		
Whole	5	50.0%	*Hard*	2	20.0%
Roughout	1	10.0%	*Soft*	0	0.0%
Tip	3	30.0%	*Mixed*	0	0.0%
Butt	0	0.0%	*Indeterminate*	8	80.0%
Fragment	1	10.0%			
Cortex retention (n=5)			Cortex position (n=5)		
0	0	0.0%	*None*	0	0.0%
>0-25%	0	0.0%	*Butt only*	2	40.0%
>25-50%	2	40.0%	*Butt and edges*	0	0.0%
>50-75%	3	60.0%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	0	0.0%
			All over	3	60.0%
Evidence of blank dimensions? (n=5)			Edge Position (n=5)		
No	0	0.0%	*All round*	0	0.0%
1 dimension	0	0.0%	*All edges sharp, dull butt*	0	0.0%
2 dimension	5	100%	*Most edges sharp, dull butt*	3	60.0%
			One sharp edge, dull butt	2	40.0%
Butt working (n=5)			*Irregular*	0	0.0%
Unworked	5	100%	*Most edges sharp, sharp butt*	0	0.0%
Partially worked	0	0.0%	*One sharp edge, sharp butt*	0	0.0%
Fully worked	0	0.0%	*Tip only*	0	0.0%
Length of cutting edge in mm (n=5)			Scar Count (n=5)		
Min	9	-	*Min*	6	-
Max	19	-	*Max*	19	-
Mean	13.1	-	*Mean*	12.6	-

Table 8.3.9 Technological observations for handaxes from Ain Abu Jemaa.

In short, the small handaxe assemblage from Ain Abu Jemaa is the product of limited (probably hard hammer) flaking of rounded river cobbles, in order to produce a bifacial edge. It could therefore be argued that all the complete handaxes from the site are medium-sized, pointed ovates as a direct result of the reduction process applied to the working of the rounded river cobbles available to the Ain Abu Jemaa knappers.

Flakes

The debitage from Ain Abu Jemaa is dominated by medium-sized, thick flakes (see table 8.3.10). This probably reflects the fact that they are all fluvially reworked (see table 8.3.4), as smaller and thinner flakes would be preferentially destroyed by fluvial transport. Large flakes may also be over-represented because of the means by which the collection was amassed; a grab sample was taken of artefacts visible in the gravel exposures, favouring the recovery of larger pieces. However, such thick flakes might also be expected to result from humans working medium-sized, rounded river cobbles - exactly the type of clast used to produce the cores and handaxes from the site.

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	63.4	49.3	19.3
Median	62.4	46.3	17.4
Min	30.8	19.5	6.4
Max	108.7	119.6	49.1
St.Dev.	16.9	16.1	7.5

Table 8.3.10 Ain Abu Jemaa flakes summary statistics (n=208, fragments excluded).

Flakes; technological observations (n=261)					
Portion (n=261)			Dorsal scars (n=208)		
Whole	208	79.7%	0	37	17.8%
Proximal	13	5.0%	1	59	28.4%
Distal	24	9.2%	2	42	20.2%
Mesial	3	1.1%	3	40	19.2%
Siret	13	5.0%	4	21	10.1%
			5	5	2.4%
			>5	1	0.5%
			Obscured	3	1.4%
Dorsal cortex retention (n=208)			Dorsal scar pattern (n=208)		
100%	35	16.8%	*Uni-directional*	111	53.4%
>50%	46	22.1%	*Bi-directional*	2	1.0%
<50%	98	47.1%	*Multi-directional*	55	26.4%
0%	26	12.5%	*Wholly cortical*	37	17.8%
Obscured	3	1.4%	*Obscured*	3	1.4%
Butt type (n=261)			Hammer mode (n=261)		
Plain	93	35.6%	*Hard*	261	100%
Dihedral	6	2.3%	*Soft*	0	0.0%
Cortical	56	21.5%	*Indeterminate*	0	0.0%
Natural (but non-cortical)	1	0.4%			
Marginal	2	0.8%	Relict core edge(s) (n=208)		
Mixed	12	4.6%	*Yes*	59	28.4%
Obscured	54	20.7%	*No*	149	71.6%
Missing	37	14.2%			

Table 8.3.11 Technological observations for flakes from Ain Abu Jemaa.

The technological attributes of the Ain Abu Jemaa flakes are summarized in table 8.3.11. Although some of these observations may be taphonomic artefacts (e.g. the total lack of soft hammer flakes), the data does allow some meaningful technological observations to be drawn. The flakes from Ain Abu Jemaa generally retain some cortex on their dorsal surface (86.0%) and display low scar counts (85.6% possess three scars or less), suggesting that they are the product of curtailed knapping sequences involving a small number of removals.

Futhermore, the fact that the flakes tend to possess unidirectional dorsal scar patterns (53.4%) indicates the flaking strategies used in their production rarely involved rotating the core, or many platform changes. Consequently, the flake data from Ain Abu Jemaa is in line with that drawn from for the cores and handaxes from the site, since all three artefact classes seem to reflect abbreviated knapping strategies applied to the reduction of medium-sized river cobbles.

Retouched Tools

A single retouched artefact was identified amongst the material studied from Ain Abu Jemaa. This is a flake retouched along one lateral edge to form a sidescraper.

Technology and Hominin Behaviour

The artefacts from Ain Abu Jemaa have clearly been subject to extensive fluvial reworking, and comprise an assemblage incorporated into gravel, currently thought to have been emplaced between MIS 36 (1.20-1.17 mya) and MIS 22 (0.88-0.85 mya). Thus, the material reflects hominin practices within a broad landscape catchment, potentially over a considerable period of time, and cannot be related to questions concerning specific technological actions at a particular point in the landscape. This observation aside, the data from the site does provide a remarkably consistent illustration of hominin technological decision making, in that all the artefact classes studied are suggestive of the limited working of medium-sized river cobbles to produce flakes and handaxes. Because the material represents an accumulation from a broad landscape catchment, this consistency in technological practices suggests that the only source of raw material available to knappers within this region was medium-sized pebbles, the form of which heavily influenced the options available to the knappers. This impression is strengthened by the fact that at Ain Tabous, located immediately downstream of Ain Abou Jemaa (see figure 8.3.1), identical core (n=55), handaxe (n=7) and flake (n=158) assemblages (personal observation) were recovered from an extension of the same deposit (Copeland 2004, 27). Similarities in the available raw material may also account for the parallels between core working practices at Ain Abu Jemaa and those previously noted at Maadan 1 and 5 (see section 8.2). A final point of interest regarding the Ain Abu Jemaa material is the presence of two simple prepared cores which, although probably fortuitous, is potentially indicative of the incipience of Levallois flaking within Lower Palaeolithic core working in this area.

8.4 Hamadine

Location & History of Investigation

During the course of the 1978 RCP 438 survey (see chapter seven, section 7.2) a second sizeable collection of Lower Palaeolithic artefacts (n=370) was recovered from gravels found at Hamadine. The artefacts obtained at this site were collected as a grab sample from fluvial deposits exposed in a gravel quarry located south-west of Tell Hamadine and adjacent to the Wadi Kharar (Copeland 2004, 27; see figure 8.4.1). This material provides an opportunity to compare Lower Palaeolithic material from this area of the Euphrates, located ~37 km south-east of Raqqa (see figure 8.1.1), to that found downstream at sites such as Ain Abu Jemaa (see section 8.3).

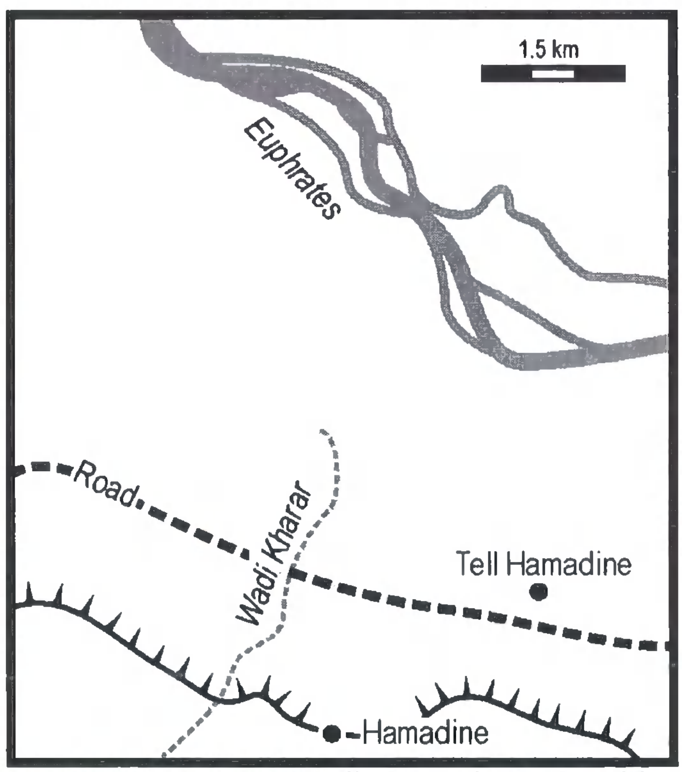

Figure 8.4.1 Location map illustrating the position of the Pleistocene fluvial deposits exposed at Hamadine.

Geological Background & Preferred Dating

Like the fluvial deposits found at Ain Abu Jemaa, the Hamadine sequence has been correlated with Qf II Euphrates formation (Besançon *et al.* 1980b, 168, Copeland 2004, 27) and consists of a lower gravel overlain by sands and silts (Sanlaville 2004, 133; see figure 8.4.2). Although their specific point of origin within this sequence is unknown, the fact that the Hamadine artefacts display abundant evidence of fluvial abrasion (see below) suggests that they probably originate from within the lower gravels. Due to the fact that Hamadine fluvial deposits are seen as the same as those found along the same stretch of the Euphrates at Ain Abu Jemaa, it is likely that they were emplaced at the same point in time. As discussed in section 8.3, the Ain Abu Jemaa material is thought to form part of a stacked fluvial sequence currently thought to have accumulated at any point between MIS 36 and MIS 22 (Demir *et al.* 2007b, 24). Consequently, the Hamadine sequence is considered here to have been emplaced at some point during the same period.

Figure 8.4.2 Photograph of fluvial deposits exposed at Hamadine (from Copeland 2004).

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Hamadine	
	No. of artefacts	**% of total**
Cores	61	18.8%
Handaxes	14	4.3%
Flakes	249	76.6%
Flake tools	1	0.3%
Total	325	100%

Table 8.4.1 Material analysed from Hamadine.

A total of 325 artefacts from Hamadine have been analysed (see table 8.4.1). All are stored in the National Museum, Damascus and are individually labelled as having been retrieved from the fluvial deposits exposed at the site.

Taphonomy of lithic assemblage

The artefacts studied from Hamadine are all similar in terms of condition (see tables 8.4.2, 8.4.3 and 8.4.4). Most are heavily rolled (83.4%; all artefacts combined) and edge damaged (92.9%; all artefacts combined), whilst the vast majority (84.6%; all artefacts combined) also show signs of fluvial battering. Consequently, it is apparent that the Hamadine artefacts have undergone extensive fluvial reworking. As a result, the collection is considered here to represent material that potentially originated from a wide area, and which was incorporated into the Hamadine gravels at some point during the time period between MIS 36 and MIS 22 (see above).

Cores from Hamadine (n=61)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	1	1.6%	*Slight edge damage*	1	1.6%
Moderately abraded	14	23.0%	*Moderate edge damage*	18	29.5%
Heavily abraded	46	75.4%	*Heavy edge damage*	42	68.9%
Unstained	1	1.6%	*Unpatinated*	1	1.6%
Lightly stained	4	6.6%	*Lightly patinated*	9	14.8%
Moderately stained	7	11.5%	*Moderately patinated*	39	63.9%
Heavily stained	49	80.3%	*Heavily patinated*	12	19.7%
No battering	2	3.3%			
Light battering	2	3.3%			
Moderate battering	48	78.7%			
Heavy battering	9	14.8%			

Table 8.4.2 Condition of all cores from Hamadine.

Handaxes from Hamadine (n=14)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	0	0.0%
Moderately abraded	0	0.0%	*Moderate edge damage*	0	0.0%
Heavily abraded	14	100%	*Heavy edge damage*	14	100%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	5	35.7%	*Lightly patinated*	4	28.6%
Moderately stained	8	57.1%	*Moderately patinated*	10	71.4%
Heavily stained	1	7.1%	*Heavily patinated*	0	0.0%
No battering	0	0.0%			
Light battering	0	0.0%			
Moderate battering	9	64.3%			
Heavy battering	5	35.7%			

Table 8.4.3 Condition of all handaxes from Hamadine.

Flakes from Hamadine (n=250)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	6	2.4%	*Slight edge damage*	0	0.0%
Moderately abraded	33	13.2%	*Moderate edge damage*	4	1.6%
Heavily abraded	211	84.4%	*Heavy edge damage*	246	98.4%
Unstained	6	2.4%	*Unpatinated*	0	0.0%
Lightly stained	20	8.0%	*Lightly patinated*	14	5.6%
Moderately stained	17	6.8%	*Moderately patinated*	178	71.2%
Heavily stained	207	82.8%	*Heavily patinated*	58	23.2%
No battering	48	19.2%			
Light battering	124	49.6%			
Moderate battering	58	23.2%			
Heavy battering	20	8.0%			

Table 8.4.4 Condition of all flakes from Hamadine.

Technology of lithic assemblage

Raw Material

	Cores (n=61)	Handaxes (n=14)
Blank form		
Nodule (Rounded)	60.7%	57.1%
Nodule (Tabular)	0.0%	0.0%
Shattered Nodule	6.6%	42.9%
Flake	4.9%	0.0%
Thermal flake	3.3%	0.0%
Indeterminate	24.6%	0.0%

Table 8.4.5 Inferred blank form for cores and handaxes studied from Hamadine.

The Hamadine artefacts were all produced on coarse-grained chert/flint blanks. Because they all display clear evidence of extensive fluvial abrasion, the source of this raw material can not be ascertained by examining remnant cortex. However, as with the abraded assemblages from Maadan and Ain Abu Jemaa, it can be inferred that the Hamadine artefacts were probably produced on nodules obtained from river gravel, since the cores (60.7%) and handaxes (57.1%) studied are mostly produced on rounded cobbles (see table 8.4.5) and the site is located a considerable distance from the nearest primary source of chert/flint (the Jebal al-Bishri located ~65 km south-west of the Hamadine; see Ponikarov *et al.* 1966, 30; 1967, 67).

Core Working

	Maximum dimensions (mm)	Weight (grams)
Mean	82.4	269.8
Median	81.0	230.0
Min	43.8	51.0
Max	130.0	727.0
St.Dev.	17.3	142.7

Table 8.4.6 Hamadine cores summary statistics (n=61).

The Hamadine core assemblage is dominated by medium-sized examples (average maximum dimension = 82.4 mm and average weight = 269.8 grams; table 8.4.6). Most are worked following reduction trajectories similar to those recorded at Maadan (see section 8.2), and Ain Abu Jemaa (see section 8.3). In terms of technological attributes (table 8.4.7), they typically exhibit few removals (average=6.8), reflecting a very few (average=1.7) short episodes (average=4.2 removals) of alternate flaking (68.3% of all core episodes). Only six of the cores studied retain more than ten scars, whilst almost a third (32.8%) retain less than five. Migrating platform cores dominate the assemblage (57.4%) but single platform cores are also common (42.2%), most of which are worked alternately (84.6%; data not tabulated).

Cores; technological observations (n=61)					
Overall core reduction (n=61)			Core episodes (n=104)		
Migrating platform	35	57.4%	*Type A: Single Removal*	15	14.4%
Single platform unprepared	26	42.6%	*Type B: Parallel flaking*	11	10.6%
Opposed platform unprepared	0	0.0%	*Type C: Alternate flaking*	71	68.3%
Discoidal	0	0.0%	*Type D: Un-attributed removal*	7	6.7%
Fragment	0	0.0%			
Flake scars/core (n=61)			Core episodes/core		
1-5	20	32.8%	*Min*	1	-
6-10	35	57.4%	*Max*	4	-
11-15	6	9.8%	*Mean*	1.7	-
>15	0	0.0%			
Max	15	-	Flake scars/core episode		
Mean	6.8	-	*Min*	1	-
			Max	15	-
% Cortex (n=61)			*Mean*	4.2	-
0	4	6.6%			
>0-25%	7	11.5%	Blank form retained? (n=61)		
>25-50%	30	49.2%	*Yes*	38	62.3%
>50-75%	20	32.8%	*No*	23	37.7%
>75%	0	0.0%			

Table 8.4.7 Technological observations for cores from Hamadine.

Given that the approach to flaking favoured at Hamadine is so limited, it is likely that these single platform cores result from a single phase of alternate flaking. These cores retain a lot of cortex; most (93.4%) have at least some, and almost a third (32.8%) retain cortex on over 50% of their surface. Most cores from the site also retain the form of the original blank selected, which, as at Maadan and Ain Abu Jemaa, were usually rounded river cobbles (see table 8.4.5). It is therefore likely that the similarities between these assemblages reflect the fact that all were produced using similar raw material, of a similar size, which only allowed a limited approach to flaking.

Handaxes

	Length (mm)	Breadth (mm)	Thickness (mm)
Mean	106.2	67.3	44.9
Median	110.6	69.2	46.5
Min	60.9	38.3	20.4
Max	138.5	84.3	66.0
St.Dev.	19.1	11.5	10.6

Table 8.4.8 Hamadine handaxe summary statistics (n=12, fragments excluded).

A total of twelve whole handaxes and two fragments were identified amongst the material studied. The morphology of the twelve complete examples is broadly similar to that observed for the handaxes from Ain Abu Jemaa (see section 8.3); they are mostly medium-sized (see table 8.4.8) and display low levels of refinement (see figure 8.4.3) but are, slightly less pointed (see figure 8.4.4). This may simply reflect the fact that many of the Hamadine handaxes are particularly heavily rolled (see table 8.4.3).

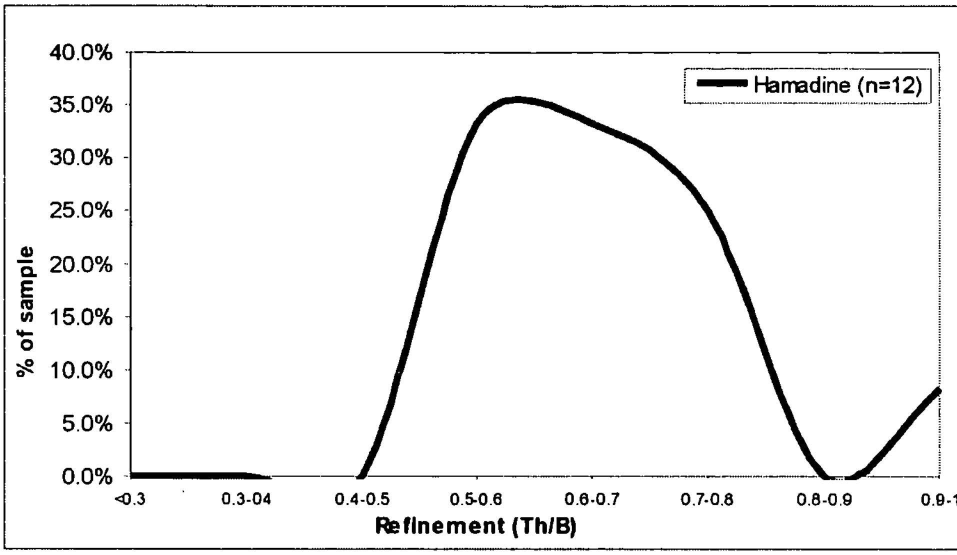

Figure 8.4.3 Levels of refinement for all whole handaxes studied from Hamadine.

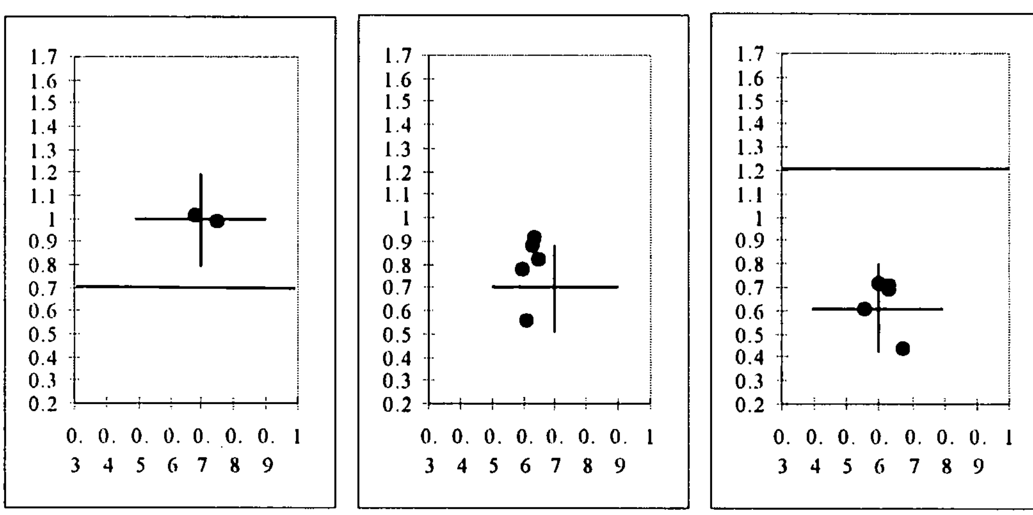

Figure 8.4.4 Tripartite diagrams for whole handaxes studied from Hamadine (n=12).

The technological attributes of the Hamadine handaxes are summarized in table 8.4.9. Unfortunately, just under half of the artefacts (41.7%) studied were too abraded to allow many of these observations to be taken. The remaining handaxes share many common attributes with those from Ain Abu Jemaa. All those for which mode of working can be assessed are the result of hard hammer flaking, while, in line with their low levels of refinement, they possess relatively few remnant scars (average count = 12.5). Futhermore, their level of cortex retention is generally high (of the seven pieces for which cortex retention could be assessed, six retain remnants on >25% of their total surface area). Apart from one example which has been completely decorticated (and which is the only example which possesses a fully worked butt), cortex is located on both the butt and, in some cases, the edges of the handaxes. Unsurprisingly, given such high levels of cortex retention, many of the handaxes from Hamadine (four out of seven, excluding those that are extremely abraded) retain the form of the original blank used in their production. This was usually a rounded river cobble, although shattered nodules were also often used (see table 8.4.5). As such, the handaxes from Hamadine, like those from Ain Abu Jemaa, are the product of limited, probable hard hammer flaking of (frequently) rounded river cobbles, in order to produce a bifacial edge.

Handaxes; technological observations (n=14)					
Portion (n=14)			Hammer mode (n=14)		
Whole	12	85.7%	*Hard*	6	42.9%
Roughout	0	0.0%	*Soft*	0	0.0%
Tip	1	7.1%	*Mixed*	0	0.0%
Butt	0	0.0%	*Indeterminate*	8	57.1%
Fragment	1	7.1%			
Cortex retention (n=12)			Cortex position (n=12)		
0	1	8.3%	*None*	1	8.3%
1-25%	0	0.0%	*Butt only*	1	8.3%
26-50%	5	41.7%	*Butt and edges*	5	41.7%
51-75%	1	8.3%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	0	0.0%
Obscured	5	41.7%	*All over*	0	0.0%
			Obscured	5	41.7%
Evidence of blank dimensions? (n=12)			Edge Position (n=12)		
No	2	16.7%	*All round*	1	8.3%
1 dimension	1	8.3%	*All edges sharp, dull butt*	5	41.7%
2 dimension	4	33.3%	*Most edges sharp, dull butt*	1	8.3%
Obscured	5	41.7%	*One sharp edge, dull butt*	0	0.0%
			Irregular	0	0.0%
Butt working (n=7)			*Most edges sharp, sharp butt*	0	0.0%
Unworked	5	71.4%	*One sharp edge, sharp butt*	0	0.0%
Partially worked	1	14.3%	*Tip only*	0	0.0%
Fully worked	1	14.3%	*Obscured*	5	41.7%
Length of cutting edge (n=7)			Scar Count (n=7)		
Min	9	-	*Min*	6	-
Max	25	-	*Max*	20	-
Mean	17.0	-	*Mean*	12.5	-

Table 8.4.9 Technological observations for handaxes from Hamadine.

Flakes

	Maximum length (mm)	**Maximum breadth (mm)**	**Maximum thickness (mm)**
Mean	64.7	51.6	20.2
Median	62.3	49.2	18.5
Min	25.8	13.9	6.3
Max	115.2	129.5	104.8
St.Dev.	17.6	17.8	9.5

Table 8.4.10 Hamadine flake summary statistics (n=221, fragments excluded).

Flakes; technological observations (n=250)					
Portion (n=250)			Dorsal scars (n=221)		
Whole	221	88.4%	0	39	17.6%
Proximal	14	5.6%	1	57	25.8%
Distal	10	4.0%	2	56	25.3%
Mesial	2	0.8%	3	27	12.2%
Siret	3	1.2%	4	9	4.1%
			5	6	2.7%
			>5	7	3.2%
			Obscured	20	9.0%
Dorsal cortex retention (n=221)			Dorsal scar pattern (n=221)		
100%	39	17.6%	*Uni-directional*	102	46.2%
>50%	51	23.1%	*Bi-directional*	32	14.5%
<50%	77	34.8%	*Multi-directional*	14	6.3%
0%	34	15.4%	*Wholly cortical*	39	17.6%
Obscured	20	9.0%	*Obscured*	34	15.4%
Butt type (n=250)			Hammer mode (n=250)		
Plain	92	36.8%	*Hard*	214	85.6%
Dihedral	15	6.0%	*Soft*	0	0.0%
Cortical	38	15.2%	*Indeterminate*	36	14.4%
Natural (but non-cortical)	3	1.2%			
Marginal	8	3.2%	Relict core edge(s) (n=221)		
Mixed	20	8.0%	*Yes*	45	20.4%
Obscured	62	24.8%	*No*	176	79.6%
Missing	12	4.8%			

Table 8.4.11 Technological observations for flakes from Hamadine.

As with the similarly abraded flake assemblages from Maadan and Ain Abu Jemaa (see section 8.2 and 8.3), Hamadine displays many attributes which can be attributed to extensive fluvial reworking (see table 8.4.4). These include the fact that most of the flakes are medium-sized and thick (see table 8.4.10), and the observation that soft hammer flakes are absent from the collection (table 8.4.11). However, as at these other sites, the morphological and technological characteristics of the flakes are also typical of debitage removed from medium-sized rounded river cobbles - which were certainly used to produce handaxes, and exploited as cores, at the site. Most notably, the flakes tend to retain at least some dorsal cortex (75.5%) and have low dorsal scar counts (80.9% possess three scars or less), which suggests that they are the product of curtailed knapping sequences involving a limited number of removals. Additionally, they often possess unidirectional dorsal scar patterns (46.2%) indicative of reduction strategies that involved minimal core rotation and very few platform changes. Consequently, the flake data from Hamadine compliments observations made for the cores and handaxes from the site, in that all three groups indicate the application of minimalist knapping strategies to the working of medium-sized river cobbles.

Retouched Tools

One retouched artefact (a flaked flake) was identified amongst the material studied from Hamadine.

Technology and Hominin Behaviour

The physical and chronological context of the lithic assemblage from Hamadine is analogous to that from Ain Abu Jemaa; it has been extensively fluvially reworked before being incorporated into gravel which is currently thought to have aggraded between MIS 36 and MIS 22. Like that from Ain Abu Jemaa, the material therefore reflects hominin practices within a broad landscape catchment, potentially over a considerable period of time, and cannot be related to ethnographic-scale questions concerning spatially or temporally specific technological actions. Notably, despite being located ~55 km downstream from Ain Abu Jemaa, the assemblage from Hamadine also reflects similar technological practices. In particular, all the artefact classes studied are again illustrative of flake and handaxe production through limited working of medium-sized river cobbles. This is significant as it indicates that the raw material exploited by the Hamadine knappers was essentially the same as that used to produce the Ain Abu Jemaa material (i.e. medium-sized river cobbles). Consequently, the Hamadine data suggests that Lower Palaeolithic assemblages from within the catchment of Euphrates between Raqqa and Deir ez-Zor share remarkably constant technological features. These shared features result from the fact that the most commonly available/selected raw material in this region was medium-sized river cobbles which exerted a significant influence on the flaking options available to the knappers.

8.5 Hammam Kebir II

Location & History of Investigation

During the course of the 1979 RCP 438 survey of the Pleistocene geology and archaeology of the upper reaches of the Syrian Euphrates and its tributary, the Sajour (see chapter seven, section 7.2), 175 artefacts were recovered from fluvial deposits exposed in a road cutting located adjacent to the village of Hammam Kebir (Besançon and Sanlaville 1981, 15, Copeland 2004, 28). The site, referred to as Hammam Kebir II, is located ~26 km south-east of the Turkish/Syrian border, along the Jerablous to Qara Qozaq stretch of the Euphrates (see figures 8.1.1 and 8.5.1). This contrasts with the Lower Palaeolithic sites previously discussed in this chapter, which are all located downstream along the Raqqa-Deir ez-Zor reach of the river.

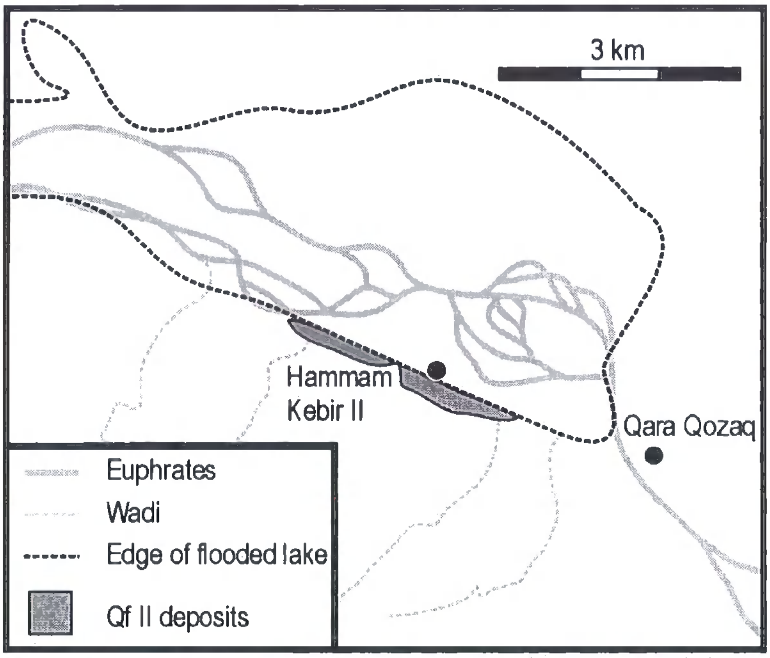

Figure 8.5.1 Location map illustrating the position of the Pleistocene fluvial deposits exposed at Hammam Kebir II.

Geological Background & Preferred Dating

The fluvial sequence exposed at Hammam Kebir II is similar to that recorded downstream at Ain Abu Jemaa and Hamadine, consisting of gravel surmounted by fine-grained material (Besançon *et al.* 1980b, 5, Copeland 2004, 28; see figure 8.5.2). Furthermore, like the deposits at these other locations, those at Hammam Kebir II have been assigned to the Qf II Euphrates formation (Besançon and Sanlaville 1981, map 2, Copeland 2004, 28). The exact stratigraphic position from which the Hammam Kebir artefacts were recovered is unknown, but the fact that they are all clearly rolled (see below) suggests that they originated from the gravels exposed at the site.

Figure 8.5.2 Photograph of fluvial deposits exposed at Hammam Kebir II (from Copeland 2004).

As the Hammam Kebir II deposits have been assigned to the same Quaternary fluvial formation as those located downstream at Ain Abu Jemaa and Hamadine, they could be associated with an upstream continuation of the same fluvial sequence, currently thought to have accumulated at any point between MIS 36 and MIS 22 (see sections 8.4 and 8.5). However, as the rate of fluvial incision appears to have been greater upstream, than downstream on the Syrian Euphrates (see chapter seven, section 7.3), the Qf II deposits found along the upper reach of the Syrian Euphrates could have been emplaced at a later date than downstream, between Raqqa and Deir ez-Zor (Demir *et al.* 2007b, 23). Furthermore, recently it has been tentatively suggested that the Qf II deposits found within the immediate vicinity of the Hammam Kebir II sequence, were emplaced during ~MIS 12 (Demir *et al.* 2007b, 23). In the absence of more conclusive chronological indicators, the approach has been taken here that the Hammam Kebir II fluvial sequence is likely to be no older than those found at Ain Abu Jemaa, Ain Tabous and Hamadine (i.e. MIS 22-36), but is likely to have been emplaced prior to MIS 10.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Hammam Kebir II	
	No. of artefacts	% of total
Non-Levallois cores	19	20.7%
Handaxes	18	19.6%
Non-Levallois flakes	55	59.8%
Flake tools	0	0.0%
Total	92	100%

Table 8.5.1 Material analysed from Hammam Kebir II.

In total, 92 artefacts from Hammam Kebir II have been identified and studied (see table 5.4.6.1). All are stored in the National Museum, Damascus and are clearly labelled as coming from the deposits exposed at the site. It will be noted that this constitutes just over half of the artefacts originally recovered from the deposits by the CNRS survey team (see above). The current location of the remaining artefacts is unknown. Because of this, only a relatively small number of artefacts from the site have been analysed, but the dataset nevertheless remains the largest collection of Lower Palaeolithic artefacts from this stretch of the Euphrates available for study.

Taphonomy of lithic assemblage

The artefacts studied from Hammam Kebir II all consistently exhibit features indicative of extensive fluvial reworking (see tables 8.5.2. 8.5.3 and 8.5.4). All are at least moderately abraded, and moderately edge damaged, whilst some (20.7%; all artefacts combined) display evidence of fluvial battering. Consequently, the assemblage is considered here to be an agglomeration of material originating from a broad landscape catchment that accumulated during, or after, the period between MIS 36 and 22, but before MIS 10 (see above).

Cores from Hammam Kebir II (n=19)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	0	0.0%
Moderately abraded	6	31.6%	*Moderate edge damage*	2	10.5%
Heavily abraded	13	68.4%	*Heavy edge damage*	17	89.5%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	0	0.0%	*Lightly patinated*	1	5.3%
Moderately stained	9	47.4%	*Moderately patinated*	17	89.5%
Heavily stained	10	52.6%	*Heavily patinated*	1	5.3%
No battering	3	15.8%			
Light battering	12	63.2%			
Moderate battering	2	10.5%			
Heavy battering	2	10.5%			

Table 8.5.2 Condition of all cores from Hammam Kebir II.

Handaxes from Hammam Kebir II (n=18)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	0	0.0%
Moderately abraded	5	27.8%	*Moderate edge damage*	1	5.6%
Heavily abraded	13	72.2%	*Heavy edge damage*	17	94.4%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	0	0.0%	*Lightly patinated*	0	0.0%
Moderately stained	3	16.7%	*Moderately patinated*	0	0.0%
Heavily stained	15	83.3%	*Heavily patinated*	18	100%
No battering	6	33.3%			
Light battering	0	0.0%			
Moderate battering	4	22.2%			
Heavy battering	8	44.4%			

Table 8.5.3 Condition of all handaxes from Hammam Kebir II.

Flakes from Hammam Kebir II (n=55)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	0	0.0%
Moderately abraded	31	56.4%	*Moderate edge damage*	5	9.1%
Heavily abraded	24	43.6%	*Heavy edge damage*	50	90.9%
Unstained	3	5.5%	*Unpatinated*	1	1.8%
Lightly stained	5	9.1%	*Lightly patinated*	22	40.0%
Moderately stained	28	50.9%	*Moderately patinated*	31	56.4%
Heavily stained	19	34.5%	*Heavily patinated*	1	1.8%
No battering	52	94.5%			
Light battering	0	0.0%			
Moderate battering	2	3.6%			
Heavy battering	1	1.8%			

Table 8.5.4 Condition of all flakes from Hammam Kebir II.

Technology of lithic assemblage

Raw Material

	Cores (n=19)	Handaxes (n=18)
Blank form		
Nodule (Rounded)	53.2%	11.1%
Nodule (Tabular)	0.0%	0.0%
Shattered Nodule	0.0%	0.0%
Flake	0.0%	5.6%
Thermal flake	0.0%	0.0%
Indeterminate	36.8%	83.3%

Table 8.5.5 Inferred blank form for cores and handaxes studied from Hammam Kebir II.

The artefacts studied from Hammam Kebir II are all on coarse-grained chert/flint blanks. The effects of post-depositional fluvial reworking on any remnant cortex means that it is difficult to assess whether these blanks were obtained from a primary or a derived source. The fact that all the cores and most of the handaxes from the site are produced on rounded cobbles (see table 8.5.5) may suggest that the raw material used in their manufacture was obtained from river gravel. However, fresh chert/flint nodules are available from Upper Cretaceous chalky-limestone outcrops located ~4 km upstream from Hammam Kebir at Tellik (Ponikarov *et al.* 1966, 30; 1967, 67; see figure 8.1.1).

Core Working

Although Hammam Kebir is located along a different stretch of the Euphrates to the other Lower Palaeolithic sites discussed here, the cores are almost identical in morphological and technological terms (see sections 8.2, 8.3 and 8.4). They tend to be medium-sized (average maximum dimension = 90.2 mm, average weight = 369.7 grams; table 8.5.6), whilst flaking proceeded through a few short flaking episodes (average number of episodes = 2.3; average number of removals per episode = 2.5; see table 5.4.6.7). Working was never prolonged;

only one core retains more than ten removals, and most actually have less than five (57.9%). It is also notable that most show at least some cortex, with almost a quarter (21.1%) retaining cortex over 50% of their surface area. This again reflects their restricted reduction. As at Hamadine, many of the cores are alternately worked from a single platform (75% of the single platform cores, which make up 42.1% of the core assemblage). Most (52.6%) actually retain the form of the original blank, which was usually a medium-sized, round cobble (table 8.5.5). In fact, Lower Palaeolithic core-working at Hammam Kebir is very like that apparent throughout the Raqqa-Deir ez-Zor reach of the Euphrates, medium-sized cobbles being summarily worked, because their size limited the reduction options available. It seems that the morphological and technological similarity of the assemblages from these sites is directly attributable to the raw material used.

	Maximum dimensions (mm)	**Weight (grams)**
Mean	90.2	369.7
Median	88.5	292.0
Min	57.4	88.0
Max	132.6	688.0
St.Dev.	21.6	197.7

Table 8.5.6 Hammam Kebir II cores summary statistics (n=19).

Cores; technological observations (n=19)					
Overall core reduction (n=19)			Core episodes (n=43)		
Migrating platform	11	57.9%	*Type A: Single Removal*	3	7.0%
Single platform unprepared	8	42.1%	*Type B: Parallel flaking*	6	14.0%
Opposed platform unprepared	0	0.0%	*Type C: Alternate flaking*	20	46.5%
Discoidal	0	0.0%	*Type D: Un-attributed removal*	14	32.5%
Fragment	0	0.0%			
Flake scars/core (n=61)			Core episodes/core		
1-5	11	57.9%	*Min*	1	-
6-10	7	36.8%	*Max*	7	-
11-15	1	5.3%	*Mean*	2.3	-
>15	0	0.0%			
Max	11	-	Flake scars/core episode		
Mean	5.6	-	*Min*	1	-
			Max	6	-
% Cortex (n=19)			*Mean*	2.5	-
0	0	0.0%			
>0-25%	5	26.3%	Blank form retained? (n=19)		
>25-50%	9	47.4%	*Yes*	10	52.6%
>50-75%	4	21.1%	*No*	8	42.1%
>75%	0	0.0%	*Obscured*	1	5.3%
Obscured	1	5.3%			

Table 8.5.7 Technological observations for cores from Hammam Kebir II.

Handaxes

	Length (mm)	Breadth (mm)	Thickness (mm)
Mean	97.6	69.5	41.4
Median	97.7	69.5	43.3
Min	50.9	42.2	20.9
Max	129.7	83.0	53.9
St.Dev.	20.1	9.7	9.2

Table 8.5.8 Hammam Kebir II handaxe summary statistics (n=14, fragments excluded).

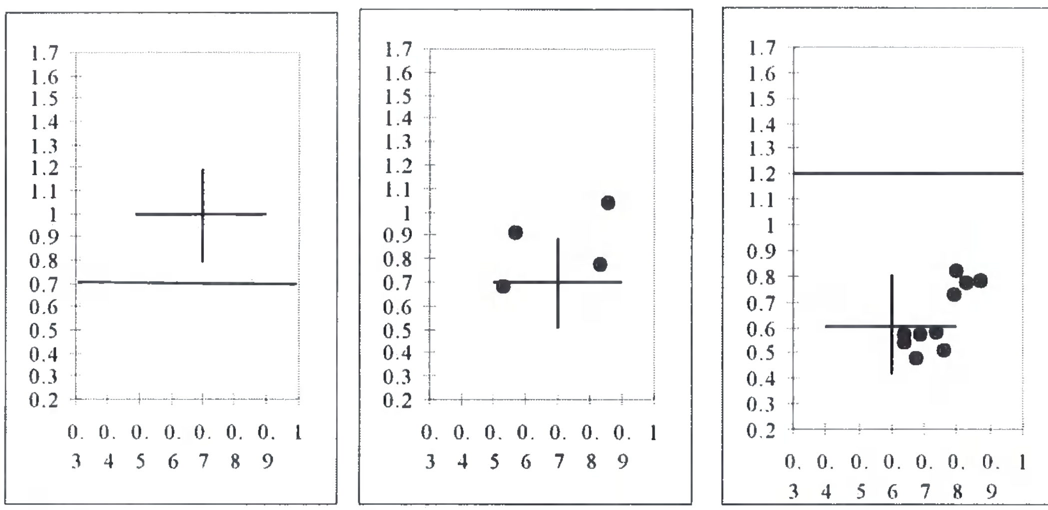

Figure 8.5.3 Tripartite diagrams for whole handaxes studied from Hammam Kebir II (n=14).

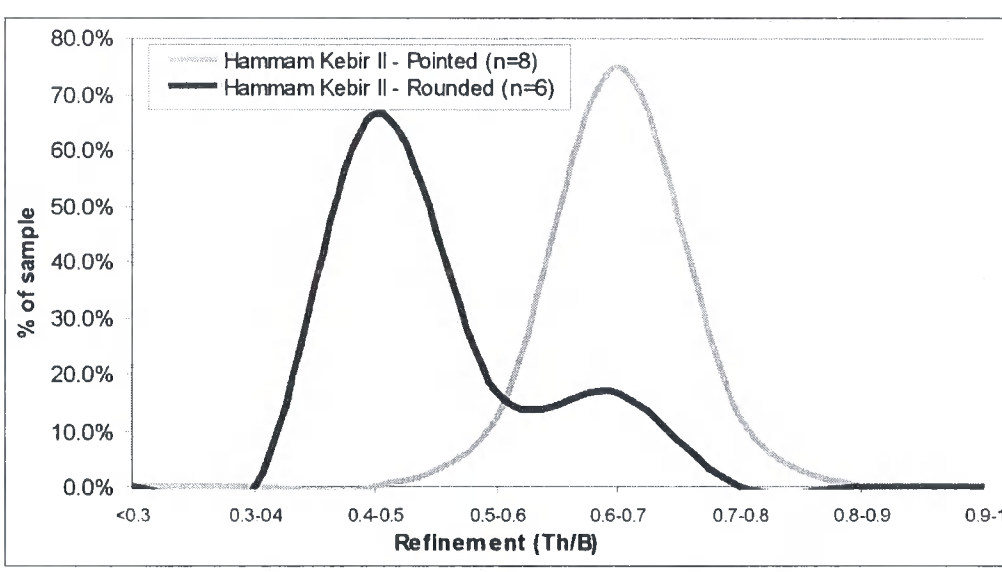

Figure 8.5.4 Levels of refinement for all whole handaxes studied from Hammam Kebir II.

The handaxe assemblage studied from Hammam Kebir II consists of fourteen whole examples, and four fragments. The complete handaxes tend to be medium-sized (see table 8.5.8). Interestingly, in terms of shape, the whole handaxes fall into two distinct categories; ovoid points/pointed ovates, and rounded points/rounded ovates (see figure 8.5.3). Furthermore, this division is reflected by the levels of refinement displayed by the handaxes, with the more rounded forms displaying consistently higher levels than those which are more elongated (see figure 8.5.4). This could be taken to suggest that two distinct handaxe assemblages are present; however, it is notable that five of the six rounded examples display such elevated levels of abrasion that many technological attributes could not be recorded, while this was only the case for two of the pointed examples. Consequently, it would seem that the presence of handaxes that display relatively high levels of "refinement", and which are rounded in planform, is a product of their specific taphonomic history (the same phenomenon is apparent amongst the assemblage from Gharmachi 1 in the Orontes Valley; see chapter 5 section 5.5). Futhermore, this suggests that the handaxes from the catchment area surrounding Hammam Kebir II tended to be medium-sized and consist of relatively unrefined pointed forms. As such, they are comparable to Lower Palaeolithic handaxes found downstream at Ain Abu Jemaa and Hamadine (see sections 8.3 and 8.4).

Handaxes; technological observations (n=18)					
Portion (n=18)			Hammer mode (n=18)		
Whole	14	77.8%	*Hard*	8	44.4%
Roughout	0	0.0%	*Soft*	0	0.0%
Tip	1	5.6%	*Mixed*	0	0.0%
Butt	2	11.1%	*Indeterminate*	10	55.6%
Fragment	1	5.6%			
Cortex retention (n=14)			Cortex position (n=14)		
0	4	28.6%	*None*	4	28.6%
>0-25%	1	7.1%	*Butt only*	0	0.0%
>25-50%	2	14.3%	*Butt and edges*	1	7.1%
>50-75%	0	0.0%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	1	7.1%
Obscured	7	50.0%	*All over*	1	7.1%
			Obscured	7	50.0%
Evidence of blank dimensions? (n=14)			Edge Position (n=14)		
No	4	28.6%	*All round*	1	7.1%
1 dimension	1	7.1%	*All edges sharp, dull butt*	3	21.4%
2 dimension	2	14.3%	*Most edges sharp, dull butt*	2	14.3%
Obscured	7	50.0%	*One sharp edge, dull butt*	0	0.0%
			Irregular	0	0.0%
Butt working (n=14)			*Most edges sharp, sharp butt*	0	0.0%
Unworked	1	7.1%	*One sharp edge, sharp butt*	0	0.0%
Partially worked	4	28.6%	*Tip only*	1	7.1%
Fully worked	2	14.3%	*Obscured*	7	50.0%
Obscured	7	50.0%			
Length of cutting edge in mm (n=7)			Scar Count (n=7)		
Min	11	-	*Min*	9	-
Max	30	-	*Max*	16	-
Mean	17.3	-	*Mean*	12.3	-

Table 8.5.9 Technological observations for handaxes from Hammam Kebir II.

Due to their extreme abrasion, it was not possible to accurately assess the technological attributes of half of the complete handaxes from Hammam Kebir II (table 8.5.9). However, the remaining handaxes share some common attributes with those analysed from Ain Abu

Jemaa (section 8.3) and Hamadine (section 8.4). For example, they display scars indicative of hard hammer working, and generally possess relatively low numbers of remnant scars (average count = 12.3). However, unlike the handaxes from the sites downstream, those from Hammam Kebir II often lack cortex (four of seven handaxes). Although this may relate to small sample size, it may suggest that the blanks used were generally larger than those used to produce handaxes further downstream, which are the same size and retain more cortex. Despite this, the fact still remains that the size and shape of the finished handaxes from Hammam Kebir is broadly analogous with those from sites located along the Raqqa-Deir ez-Zor stretch of the Euphrates, as is the general approach taken to handaxe reduction - limited intensity flaking, probably using a hard hammer.

Flakes

	Maximum length (mm)	**Maximum breadth (mm)**	**Maximum thickness (mm)**
Mean	64.3	46.9	16.9
Median	65.3	44.5	16.4
Min	24.7	22.7	6.9
Max	113.5	90.9	29.4
St.Dev.	19.4	17.7	5.9

Table 8.5.10 Hammam Kebir II flake summary statistics (n=48, fragments excluded).

Flakes; technological observations (n=55)					
Portion (n=55)			Dorsal scars (n=48)		
Whole	48	87.3%	0	0	0.0%
Proximal	2	3.6%	1	13	27.1%
Distal	3	5.5%	2	16	33.3%
Mesial	0	0.0%	3	11	22.9%
Siret	2	3.6%	4	7	14.6%
			5	1	2.1%
			>5	0	0.0%
Dorsal cortex retention (n=48)			Dorsal scar pattern (n=48)		
100%	0	0.0%	*Uni-directional*	13	27.0%
>50%	1	2.1%	*Bi-directional*	3	6.3%
<50%	27	56.3%	*Multi-directional*	32	66.7%
0%	20	41.7%	*Wholly cortical*	0	0.0%
Butt type (n=55)			Hammer mode (n=55)		
Plain	29	52.7%	*Hard*	54	98.2%
Dihedral	0	0.0%	*Soft*	0	0.0%
Cortical	3	5.5%	*Indeterminate*	1	1.8%
Natural (but non-cortical)	2	3.6%			
Marginal	3	5.5%	Relict core edge(s) (n=48)		
Mixed	0	0.0%	*Yes*	15	31.3%
Obscured	15	27.3%	*No*	33	68.7%
Missing	3	5.5%			

Table 8.5.11 Technological observations for flakes from Hammam Kebir II.

Like the other abraded flake assemblages studied in this chapter, the analytical value of that from Hammam Kebir is limited by the fact that many of the technological and morphological features they exhibit could be a result of fluvial sorting (e.g. the dominance of medium-sized, relatively thick flakes; see table 8.5.10). Additionally, in this particular case the small size of the Hammam Kebir collection (n=55) further limits the amount of information which can be drawn from this data. The lack of cortical flakes in the assemblage is intriguing as is the fact that an elevated proportion (41.7%) has no remnant cortex (table 8.5.11). However, as the assemblage is clearly derived, no explanation for these low levels of cortex retention can be offered, save that it may be a product of small sample size. The most informative aspect of the flake data from Hammam Kebir II is the low number of dorsal scars on the flakes (83.3% possess three scars or less), which suggests that they are the product of curtailed knapping sequences similar to those associated with the reduction of the cores and handaxe from the site.

Retouched Tools

No retouched artefacts were identified amongst the material studied from Hammam Kebir II.

Technology and Hominin Behaviour

Like the Lower Palaeolithic collections discussed previously in this chapter, that from Hammam Kebir II is clearly reworked and, as such, represents hominin technological practices within a wide landscape catchment. In addition, although the assemblage was incorporated into gravels located considerably further upstream than those found at Ain Abu Jemaa and Hamadine, it clearly displays comparable technological features. This is particularly significant in the case of the handaxe assemblage from the site. It has been suggested that handaxe assemblages recovered from Qf II terraces upstream on the Syrian Euphrates contrast with those downstream because, in addition to unrefined pointed forms, they contain "classic" refined ovates (Copeland 2004, 44). However, analysis of the Hammam Kebir II handaxes suggests these more "refined" ovates are in fact a product of extreme levels of fluvial abrasion and that the handaxes from the catchment area surrounding the site originally tended to be medium-sized, relatively unrefined pointed forms similar to those found downstream along the Raqqa-Deir ez-Zor stretch of the Euphrates.

A further technological feature shared by Hammam Kebir II artefacts and those from Lower Palaeolithic sites located downstream on the Syrian Euphrates is the fact that all artefact classes suggest the application of limited working to medium-sized river cobbles in order to produce flakes and handaxes. This is notable as it indicates that Lower Palaeolithic assemblages from both the upper and lower reaches of the Syrian Euphrates are the product of a similar approach to flaking. Futhermore, it supports the assertion that the general homogeneity in core and handaxe working in the middle Euphrates Valley is a product of the use of volumetrically consistent raw material which exerted a significant influence on the flaking options available to Lower Palaeolithic knappers.

8.6 Halouanndji IV

Location & History of Investigation

The site of Halouanndji IV is located on the banks of a tributary of the upper Syrian Euphrates, the Sajour, at a point ~16 km west of their confluence (see figures 5.5.1 and 5.6.1). Here, 155 artefacts were recovered from a conglomerate, thought to be contemporary with Qf II deposits identified in the Euphrates Valley itself (Besançon and Sanlaville 1981, map 2, Copeland 2004, 26). This material provides an opportunity to assess whether any technological differences are discernable between a site situated outside the catchment of the Euphrates proper and those previous analysed in this chapter, which are all located in the main valley.

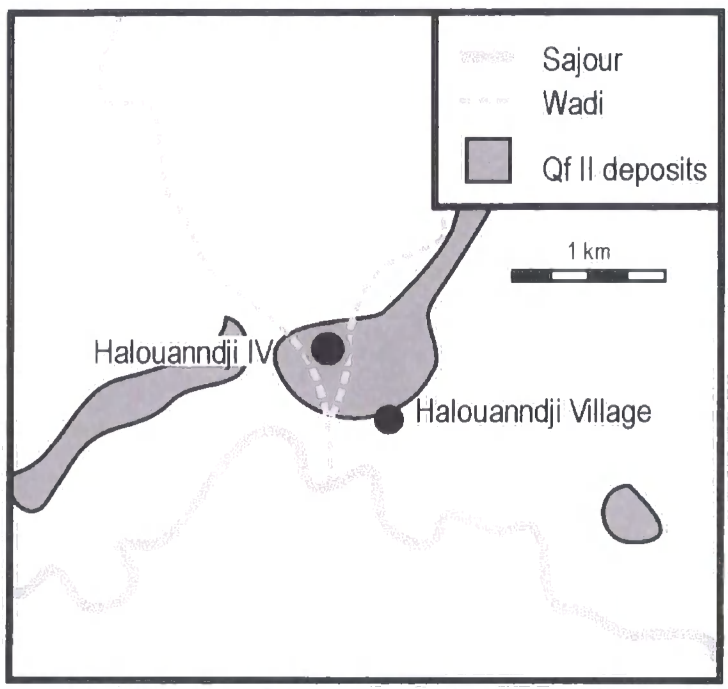

Figure 8.6.1 Location map illustrating the position of the Pleistocene fluvial deposits exposed at Halouanndji IV.

Geological Background & Preferred Dating

The Halouanndji IV conglomerate has been correlated with the same Quaternary fluvial formation as deposits located in the Euphrates Valley at Hammam Kebir II (Besançon and Sanlaville 1981, map 2, Copeland 2004, 26). Consequently, the assumption has been made here that the fluvial material found at these two locations was emplaced at approximately the same time. As the Hammam Kebir II fluvial sequence is thought to be no older than MIS 22-36, but is likely to have been emplaced prior to MIS 10 (see section 8.5), the Halouanndji IV conglomerate is taken here to have been deposited at some point during the same period.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Halouanndji IV	
	No. of artefacts	**% of total**
Non-Levallois cores	27	17.9%
Handaxes	4	2.6%
Non-Levallois flakes	118	78.1%
Flake tools	2	1.4%
Total	151	100%

Table 8.6.1 Material analysed from Halouanndji IV.

This study has analysed 151 artefacts from Halouanndji IV (see table 8.6.1). All are currently stored in the National Museum, Damascus and are clearly labelled as having been recovered from the conglomerate exposure found at the site.

Taphonomy of lithic assemblage

Cores from Halouanndji IV (n=27)					
Unabraded	7	25.9%	*No edge damage*	2	7.4%
Slightly abraded	4	14.8%	*Slight edge damage*	7	25.9%
Moderately abraded	7	25.9%	*Moderate edge damage*	14	51.9%
Heavily abraded	9	33.4%	*Heavy edge damage*	4	14.8%
Unstained	4	14.8%	*Unpatinated*	0	0.0%
Lightly stained	0	0.0%	*Lightly patinated*	3	11.1%
Moderately stained	0	0.0%	*Moderately patinated*	20	74.1%
Heavily stained	23	85.2%	*Heavily patinated*	4	14.8%
No battering	25	92.6%			
Light battering	0	0.0%			
Moderate battering	2	7.4%			
Heavy battering	0	0.0%			

Table 8.6.2 Condition of all cores from Halouanndji IV.

Handaxes from Halouanndji IV (n=4)					
Unabraded	0	0.0%	*No edge damage*	0	0.0%
Slightly abraded	0	0.0%	*Slight edge damage*	1	25.0%
Moderately abraded	4	100%	*Moderate edge damage*	2	50.0%
Heavily abraded	0	0.0%	*Heavy edge damage*	1	25.0%
Unstained	0	0.0%	*Unpatinated*	0	0.0%
Lightly stained	0	0.0%	*Lightly patinated*	0	0.0%
Moderately stained	1	25.0%	*Moderately patinated*	3	75.0%
Heavily stained	3	75.0%	*Heavily patinated*	1	25.0%
No battering	4	100%			
Light battering	0	0.0%			
Moderate battering	0	0.0%			
Heavy battering	0	0.0%			

Table 8.6.3 Condition of all handaxes from Halouanndji IV.

Flakes from Halouanndji IV (n=120)					
Unabraded	31	25.8%	*No edge damage*	2	1.7%
Slightly abraded	14	11.7%	*Slight edge damage*	11	9.2%
Moderately abraded	33	27.5%	*Moderate edge damage*	28	23.3%
Heavily abraded	42	35.0%	*Heavy edge damage*	79	65.8%
Unstained	17	14.2%	*Unpatinated*	1	0.8%
Lightly stained	3	2.5%	*Lightly patinated*	15	12.5%
Moderately stained	13	10.8%	*Moderately patinated*	66	55.0%
Heavily stained	87	72.5%	*Heavily patinated*	38	31.7%
No battering	103	85.8%			
Light battering	1	0.8%			
Moderate battering	16	13.4%			
Heavy battering	0	0.0%			

Table 8.6.4 Condition of all flakes from Halouanndji IV.

In contrast to all the other Lower Palaeolithic sites discussed in this chapter, the physical condition of the artefacts from Halouanndji IV (tables 8.6.2, 8.6.3 and 8.6.4) indicates that, in addition to a heavily reworked component, the assemblage contains some minimally disturbed material. This is made clear by the fact that, whilst some of the assemblage is moderately to heavily abraded (62.9%; all artefacts combined) and moderately to heavily edge damaged (84.8%; all artefacts combined), a significant component is unabraded or only slightly abraded (37.1%; all artefacts combined) and displays minimal, if any, edge damage (15.2%; all artefacts combined). It therefore seems apparent that the collection includes two distinct groups of artefacts; those which comprise a reworked accumulation of material originating from a broad landscape catchment that accumulated during, or subsequent, to the period between MIS 36 and 22, but prior to MIS 10 (see above), and a minimally disturbed element which is a product of flint working directly associated with Halouanndji IV locale.

Technology of lithic assemblage

Raw Material

	Cores (n=11)	Handaxes (n=0)	Flakes (n=45)
Raw material			
Fresh	0.0%	-	0.0%
Derived	63.6%	-	48.9%
Indeterminate	36.4%	-	51.1%
	Cores (n=27)	**Handaxes (n=4)**	
Blank form			
Nodule (Rounded)	66.7%	50.0%	
Nodule (Tabular)	0.0%	0.0%	
Shattered Nodule	14.8%	0.0%	
Flake	0.0%	0.0%	
Thermal flake	0.0%	0.0%	
Indeterminate	18.5%	50.0%	

Table 8.6.5 Raw material (artefacts in fresh to slightly abraded condition only) and inferred blank form (all artefacts) for material studied from Halouanndji IV.

The artefacts studied from Halouanndji IV are all produced on coarse-grained chert/flint. The less abraded artefacts that retain cortex are on rounded fluvially derived chert/flint clasts (table 8.6.5), suggesting that the relatively fresh core and handaxe assemblage from the site was produced on rounded cobbles. The fact that most of the abraded pieces are also on rounded blanks (table 8.6.5) which appear to be morphologically analogous to those used in the production of the fresher pieces (personal observation), may indicate that these are also on nodules obtained from river gravel.

Core Working

As material which is minimally reworked is clearly present amongst the artefacts recovered from Halouanndji IV, the cores from the site were divided according to condition prior to analysis. However, as no technological differences were apparent between the groupings, their attributes are presented together here (tables 8.6.6 and 8.6.7).

	Maximum dimensions (mm)	Weight (grams)
Mean	84.7	354.0
Median	82.5	256.0
Min	54.8	76.0
Max	139.1	1244.0
St.Dev.	22.2	273.8

Table 8.6.6 Halouanndji IV cores summary statistics (n=27).

Cores; technological observations (n=27)					
Overall core reduction (n=27)			Core episodes (n=46)		
Migrating platform	14	51.9%	*Type A: Single Removal*	5	10.9%
Single platform unprepared	10	37.0%	*Type B: Parallel flaking*	9	19.6%
Opposed platform unprepared	0	0.0%	*Type C: Alternate flaking*	28	60.9%
Discoidal	2	7.4%	*Type D: Un-attributed removal*	4	8.7%
Obscured	1	3.7%			
Flake scars/core (n=27)			Core episodes/core		
1-5	8	29.6%	*Min*	1	-
6-10	13	48.1%	*Max*	4	-
11-15	5	18.5%	*Mean*	1.8	-
>15	0	0.0%			
Obscured	1	3.7%	Flake scars/core episode		
Max	13	-	*Min*	1	-
Mean	7.4	-	*Max*	11	-
			Mean	4.4	-
% Cortex (n=27)					
0	1	3.7%			
1-25%	6	22.2%	Blank form retained? (n=27)		
26-50%	11	40.7%	*Yes*	16	59.3%
51-75%	6	22.2%	*No*	10	37.0%
>75%	2	7.4%	*Obscured*	1	3.7%
Obscured	1	3.7%			

Table 8.6.7 Technological observations for cores from Halouanndji IV.

The Halouanndji cores are remarkably like those recovered from sites in the main valley of the Syrian Euphrates, in form as well as the techniques used to produce them (tables 8.6.6 and 8.6.7; see sections 8.2, 8.3, 8.4 and 8.5). Only a few (average 1.8) episodes were used to produce flakes from these medium-sized cores (average maximum dimension 84.7 mm, average weight 354 grams.). These episodes were short, involving on average 4.4 removals. None of the cores were extensively worked; only five retain more than 5 flake scars, and none possess more than 13. All cores also retain cortex, and almost a third (29.6%) retain over 50%. Many of the cores have only a single platform (37.0%), most of which were alternately exploited (70%; data not tabulated). Similar patterns were also apparent at Hamadine (see section 8.4) and Hammam Kebir II (see section 8.5). Blank form can be inferred for most of the cores and rounded cobbles were most commonly used (see table 8.6.5). Consequently, like all other core assemblages considered in this chapter, Halouanndji IV reflects the limited working of volumetrically restrictive, medium-sized cobbles, which did not permit extensive flake production.

Handaxes

	Length (mm)	Breadth (mm)	Thickness (mm)
Hal 4 2096	128.4	67.3	56.7
Hal 4 2097	135.4	69.1	44.2
Hal 4 2098	87.5	47.5	43.3

Table 8.6.8 Halouanndji IV handaxe summary statistics (roughout excluded).

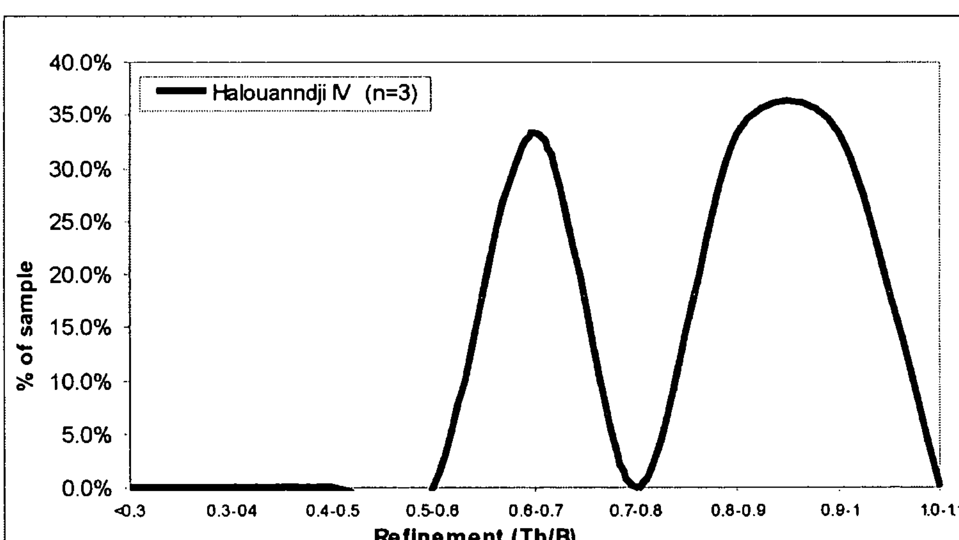

Figure 8.6.2 Levels of refinement for all whole handaxes studied from Halouanndji IV.

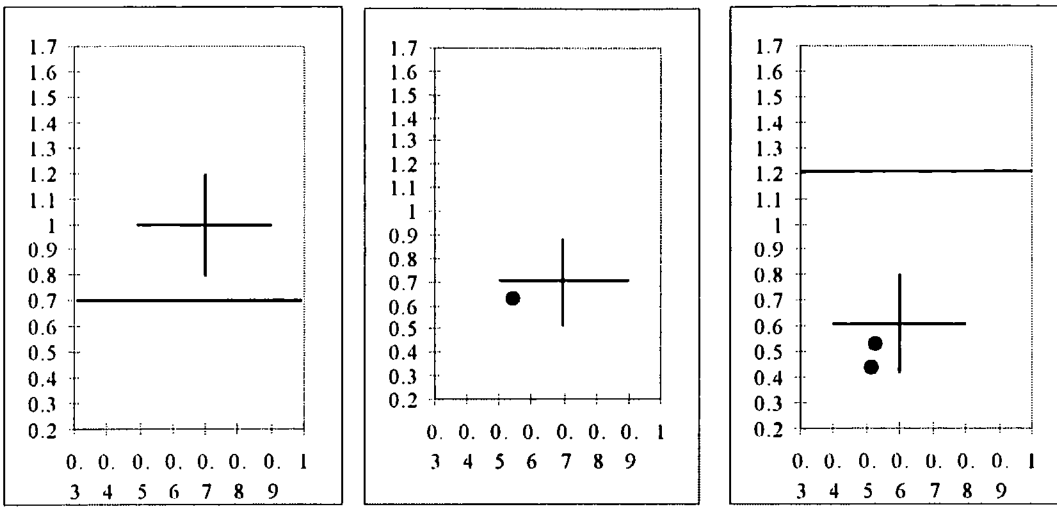

Figure 8.6.3 Tripartite diagrams for whole handaxes studied from Halouanndji IV (n=3).

Handaxes; technological observations (n=4)					
Portion (n=4)			Hammer mode (n=4)		
Whole	3	75.0%	*Hard*	4	100%
Roughout	1	25.0%	*Soft*	0	0.0%
Tip	0	0.0%	*Mixed*	0	0.0%
Butt	0	0.0%	*Indeterminate*	0	0.0%
Fragment	0	0.0%			
Cortex retention (n=3)			Cortex position (n=3)		
0	0	0.0%	*None*	0	0.0%
>0-25%	1	25.0%	*Butt only*	2	75.0%
>25-50%	2	75.0%	*Butt and edges*	0	0.0%
>50-75%	0	0.0%	*Edges only*	0	0.0%
>75%	0	0.0%	*On face*	0	0.0%
			All over	1	25.0%
Evidence of blank dimensions? (n=3)			Edge Position (n=3)		
No	1	25.0%	*All round*	0	0.0%
1 dimension	0	0.0%	*All edges sharp, dull butt*	1	33.3%
2 dimension	2	75.0%	*Most edges sharp, dull butt*	1	33.3%
			One sharp edge, dull butt	0	0.0%
Butt working (n=3)			*Irregular*	0	0.0%
Unworked	1	25.0%	*Most edges sharp, sharp butt*	0	0.0%
Partially worked	2	75.0%	*One sharp edge, sharp butt*	0	0.0%
Fully worked	0	0.0%	*Tip only*	1	33.3%
Length of cutting edge in mm (n=3)			Scar Count (n=3)		
Min	9	-	*Min*	8	-
Max	19	-	*Max*	12	-
Mean	14.7	-	*Mean*	10.3	-

Table 8.6.9 Technological observations for handaxes from Halouanndji IV.

The small handaxe assemblage analysed from Halouanndji IV consists of four whole examples, one of which is a roughout. All are moderately abraded (see table 8.6.5), and have therefore been fluvially transported The morphology of the three complete examples is similar to that observed for the handaxes from Lower Palaeolithic sites in the main valley of the Syrian Euphrates (see sections 8.3, 8.4, and 8.5) in that they are medium-sized (see table

8.6.8), display low levels of refinement (see figure 8.6.2) and are pointed in planform (see figure 8.6.3).

The technological attributes of the handaxes from Halouanndji IV (see table 8.6.9) are analogous to those displayed by Lower Palaeolithic examples from sites in the Euphrates Valley. The three complete handaxes are all the result of hard hammer working, possess relatively few remnant scars (average count = 10.3) and some cortex, possess a cutting edge on their lateral margin(s) or tip, and a dull butt which, in two of the three examples, is only partially worked. Futhermore, two of the complete handaxes retain enough cortex to recreate the blanks on which they were produced; in both instances this was a rounded cobble (see table 8.6.5). Consequently, the handaxes from Halouanndji IV, like those from the other sites considered in this chapter, are the product of limited hard hammer flaking of rounded nodules, which resulted in the production of relatively unrefined, medium-sized, pointed handaxes.

Flakes

The presence of fresh flakes amongst the largely abraded flake assemblage collected from the Halouanndji IV conglomerate meant that the collection was split according to condition prior to analysis. However, as no technological differences were evident between these two groupings, their attributes are presented together here (tables 8.6.10 and 8.6.11).

	Maximum length (mm)	**Maximum breadth (mm)**	**Maximum thickness (mm)**
Mean	67.3	55.3	22.1
Median	65.3	51.8	20.8
Min	24.6	25.4	8.3
Max	134.4	113.6	52.6
St.Dev.	21.0	20.0	8/8

Table 8.6.10 Halouanndji IV flake summary statistics (n=103, fragments excluded).

The flake assemblage from Halouanndji IV is dominated by medium-sized, relatively robust examples (table 8.6.10). With regards to the reworked pieces, this could be a result of fluvial transport. However, this is also true of the fresh flakes, which are also likely to have come from medium-sized rounded river cobbles, similar to those selected to produce the cores and handaxes found at the site (although collector bias could also be factor). If this is so it could also be argued that this is suggestive of core working having occurred at the locale. This is supported by the technological attributes of the Halouanndji IV flakes (summarized in table 8.6.11) which suggest that they are a product of a curtailed knapping strategy, similar to that applied to the working of the cores from the site. This is illustrated by the facts that the vast majority (88.3%) retain at least some cortex on their dorsal surface, and that they generally exhibit low numbers of dorsal scars (86.3% possess three scars or less). Furthermore, this impression is strengthened by the presence of a large number of flakes which possess uncomplicated dorsal scar patterns (57.3% possess a unidirectional dorsal scar pattern), which suggests that the reduction strategies employed by the Halouanndji knappers rarely involved many platforms or much in-hand core rotation. As the three handaxes and the one roughout found amongst the collection studied appear to be derived - see above - it is unclear whether or not handaxes were also manufactured at the site.

Flakes; technological observations (n=120)					
Portion (n=120)			Dorsal scars (n=103)		
Whole	103	85.8%	0	19	18.4%
Proximal	1	0.8%	1	28	27.2%
Distal	9	7.5%	2	26	25.2%
Mesial	2	1.7%	3	16	15.5%
Siret	5	4.2%	4	3	2.9%
			5	9	8.7%
			>5	1	1.1%
			Obscured	1	1.1%
Dorsal cortex retention (n=103)			Dorsal scar pattern (n=103)		
100%	19	18.4%	*Uni-directional*	59	57.3%
>50%	17	16.5%	*Bi-directional*	7	6.8%
<50%	55	53.4%	*Multi-directional*	17	16.5%
0%	11	10.7%	*Wholly cortical*	19	18.4%
Obscured	1	1.0%	*Obscured*	1	1.0%
Butt type (n=120)			Hammer mode (n=120)		
Plain	50	41.7%	*Hard*	120	100%
Dihedral	2	1.7%	*Soft*	0	0.0%
Cortical	22	18.3%	*Indeterminate*	0	0.0%
Natural (but non-cortical)	1	0.8%			
Marginal	2	1.7%	Relict core edge(s) (n=120)		
Mixed	4	3.3%	*Yes*	21	17.5%
Obscured	24	20.0%	*No*	98	81.7%
Missing	15	12.5%	*Obscured*	1	0.8%

Table 8.6.11 Technological observations for flakes from Halouanndji IV.

Retouched Tools

Two retouched artefacts were identified amongst the material studied from Halouanndji IV. Both are unabraded and are on flake blanks. One retains evidence of secondary working along a single lateral edge which forms a notch, while the other is a denticulate with retouch located at the distal end.

Technology and Hominin Behaviour

Unlike the other sites discussed in this chapter, the Halouanndji IV artefacts are not associated with Euphrates fluvial deposits, but with conglomerate laid down by a tributary, the Sajour. Furthermore, the assemblage from the site is unique amongst Lower Palaeolithic collections discussed in this chapter; in addition to a clearly derived element, it contains some artefacts which are minimally reworked, if at all. The material, therefore, possesses the potential to provide insights into hominin technological practices both within the wider landscape catchment of the Sajour, and at a specific place which hominins obtained raw material.

Significantly, the fresh and derived elements from Halouanndji share the same technological features; both are characteristic of the application of limited working of medium-sized river cobbles in order to produce flakes and handaxes. Futhermore, these attributes are broadly analogous with those recorded for Lower Palaeolithic sites in the main Euphrates valley. This data supports the contention that Lower Palaeolithic technological approaches are generally homogenous throughout the wide landscape catchment of the Syrian Euphrates, and that this homogeneity results from the consistent size and shape of the raw material available throughout the region. This exerted a uniform and significant influence on the flaking options available to early human knappers. Furthermore, the fact that this same patterning can be discerned amongst minimally reworked material is illustrative of the same general picture being played out on a local scale.

8.7 Summary of the Lower Palaeolithic Occupation in the Euphrates Valley in Syria

The Lower Palaeolithic sites from the catchment of the Syrian Euphrates presented here are all very similar in both technological and taphonomical terms. All are (for the most part) extremely heavily abraded, and can thus be regarded as landscape-scale samples of human residues from throughout the river catchment, manufactured and discarded over extended periods of time. Technologically, one could regard these sites as fairly unremarkable; simple core and flake working of river cobbles is apparent at all, whilst handaxes - when manufactured at all - are summarily worked, generally using a hard hammer. However, the Lower Palaeolithic archaeological record of the Euphrates Valley is remarkable not only *because* of its consistency - reflecting the response of hominin choice to limiting technological factors - but also because of the great antiquity of many of these sites.

The Near East has long been regarded as central to understanding patterns of human migration from Africa, throughout the Palaeolithic. However, it is notable that very few artefacts or human fossils are actually known from the region (especially outside of Palestine/Israel) which can be related to the earliest human movements out of the East African Rift Valley. This study has analysed artefact assemblages from three sites currently dated to between 1.20 and 0.85 million years ago (Ain Abu Jemaa and Hamadine are presented here in detail; identical technological patterns were also identified amongst a smaller assemblage from Ain Tabous), as well as two collections which may be older than 1.20 million years (Maadan 1 and 5). This small, but significant corpus of sites predates the earliest occurrences in the Orontes Valley by at least half a million years, and is the only evidence for an early human presence outside Africa from the northern part of the Near East. It therefore seems likely that the Euphrates Valley may have served as a conduit for human incursion into the area, perhaps having left East Africa via the Arabian Peninsula. However, research into the latter area is as yet limited and the ultimate route taken by hominins to reach the Euphrates Valley remains a moot point.

It is significant that all the artefact assemblages analysed - from the very earliest (Maadan 1 and 5) to those from Qf II deposits of the upper Syrian Euphrates and the Sajour (Hammam Kebir II and Halouanndji IV) - are extremely similar. The approach to technological analysis followed here emphasises the need to appreciate local and contingent factors which may have impacted upon the composition of the assemblages studied. Heavily abraded landscape samples, such as those presented here, reflect repeated action within a given regional catchment - and emphasise the fact that even over protracted periods of time, local affordances exerted a strong and continuous influence upon the choices available to Lower Palaeolithic people. The very fact that the assemblages considered here have been so heavily modified by fluvial movement has, to an extent, impacted upon variability in handaxe form - a fact which can only be appreciated through a careful consideration of taphonomic factors. Thus, it is suggested here that the presence of "refined" ovates handaxes at Hammam Kebir II is not a chronologically significant observation, but actually a function of fluvial reworking - these examples being the most heavily abraded from the site

Through a detailed appreciation of the contexts from which these collections derive, this study has shown that Lower Palaeolithic sites in the Euphrates Valley do not, in fact, reflect the existence of chronologically-bounded technological or cultural traditions, but rather, reflect the application of a common technological approach to the working of extremely limiting raw material. The only material available throughout the Euphrates catchment in Syria (except for a single bedrock outcrop located near Tellik village) is small-medium-sized river pebbles brought down from Turkey. These did not allow extensive reduction, and at all sites were summarily worked to produce the largest possible flakes. The continuous effect of such material upon the options available to Lower Palaeolithic knappers is apparent both on a landscape-scale (through analysis of the abraded, time-averaged accumulations from all sites), and in response to the material available at a particular place (the fresh material from Halouanndji IV). Notably, handaxes never form a large component of any Lower Palaeolithic assemblage from the Euphrates, a reflection of the intractable nature of the available blanks which preclude extensive reduction. It is suggested here that the small assemblages from Maadan 1 and 5 lack handaxes as a function of sample size, rather than their age and potentially "Oldowan" character, or the loss of particular techniques by pioneer groups (*cf.* Villa 2001).

Chapter 9
The Earlier Palaeolithic of the Euphrates Valley – Middle Palaeolithic Sites

9. 1 Introduction

In this chapter Middle Palaeolithic artefact collections from the valley of the Syrian Euphrates and its tributaries are analysed. Although associated with fluvial deposits, all are surface finds. Consequently, their identification as "Middle Palaeolithic" is based on their typo-technological characteristics, following the criteria outlined in chapter three. In total four assemblages have been considered; three (Rhayat 2, Chnine East 1 and Chnine West 1) are located near the confluence between the Euphrates and the River Balikh, whilst the remaining site (Qara Yaaqoub) is located upstream overlooking the valley of the River Sajour (see figure 9.1.1). The selected Middle Palaeolithic sites from the Euphrates are presented here individually. Following the approach adopted in previous chapters their chronostratigraphic, geographic and taphonomic context is considered prior to a detailed technological assessment being provided. Utilising information from this process the site-specific assessments of hominin technological decision making and landscape-use practises are then advanced. These are then collated to enable general conclusions to be drawn regarding Middle Palaeolithic technological practices and landscape-use in the Euphrates Valley.

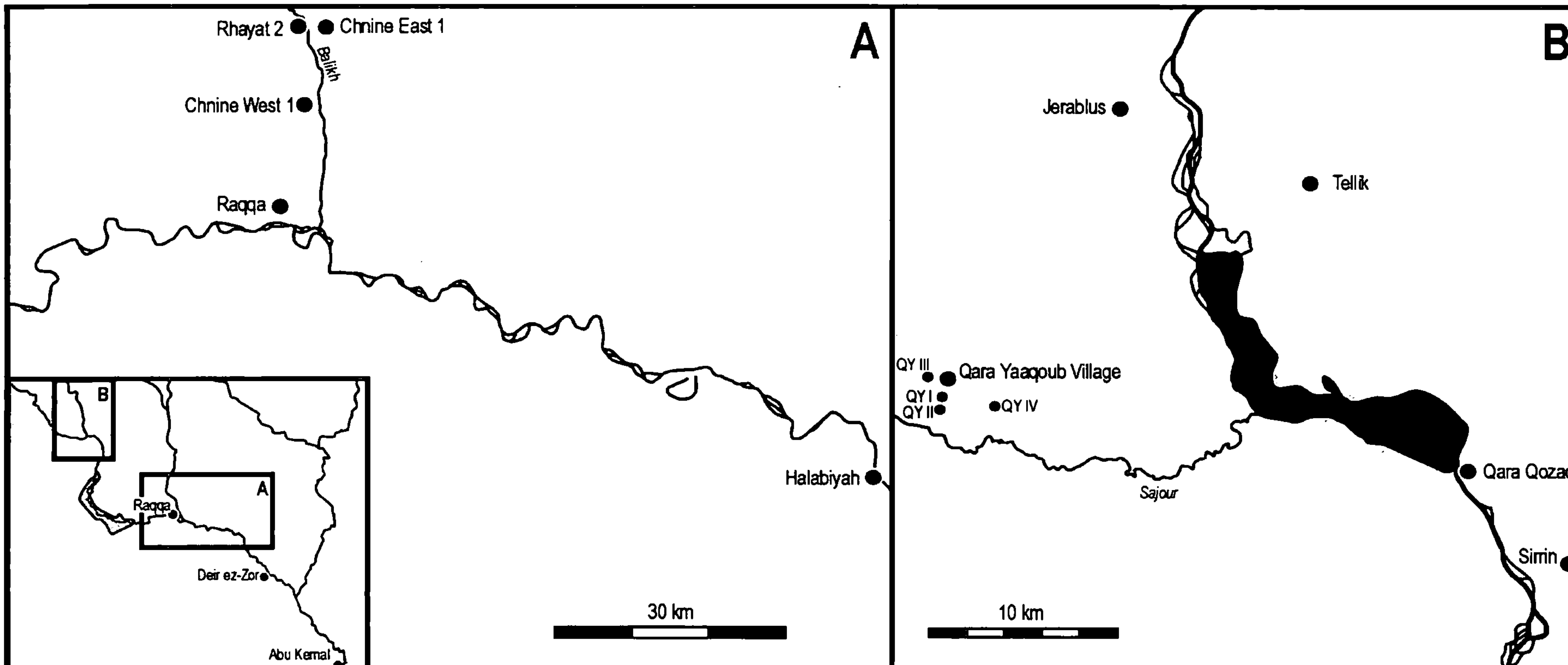

Figure 9.1.1 *Location map illustrating the position all sites referred to in chapter 9.*

9.2 Rhayat 2

Location & History of Investigation

During the 1978 RCP 438 survey of the Pleistocene geology and archaeology of the Syrian Euphrates (see chapter seven, section 7.2) 388 artefacts were recovered from fluvial deposits located near of the village of Rhayat. The site, referred to as Rhayat 2, is located on the west bank of the River Balikh (Besançon *et al.* 1980a, figure 1, Besançon and Sanlaville 1981, figure 7), ~16 km upstream from its confluence with the Euphrates (see figure 9.2.1).

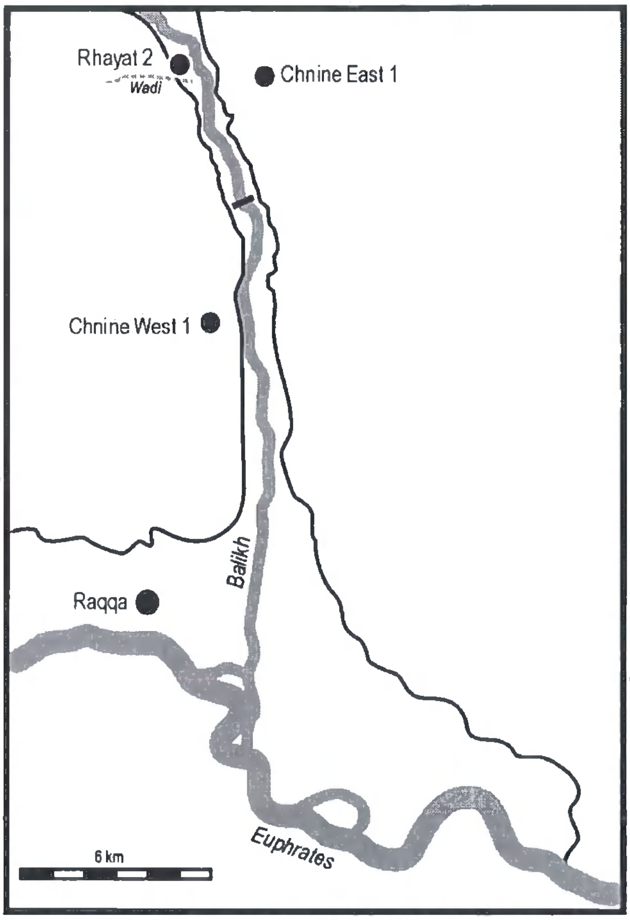

Figure 9.2.1 Location map illustrating the position of Middle Palaeolithic findspots in the lower Balikh Valley.

Geological Background & Preferred Dating

The artefacts collected at Rhayat 2 were recovered as a grab sample from Pleistocene gravels which had been cut through and exposed by a wadi (Copeland 2004, 29). They are located in the valley of the Balikh ~8 m above the river (Besançon and Sanlaville 1981, figure 7, Copeland 2004, 48). The Rhayat deposits have been correlated with the Qf I formation of the Euphrates (Besançon and Sanlaville 1981, figure 7, Copeland 2004, 48; see chapter seven, section 7.3 for an explanation of terrace nomenclature) and have been tentatively suggested to have aggraded at some point between MIS 6 and MIS 4 (Copeland 2004, 23). However, beyond the fact that the deposits are located at a relatively low altitude, there is currently little corroboratory evidence to support this date. Consequently, it is regarded here as a broad estimate.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	Rhayat 2	
	No. of artefacts	**% of total**
Levallois cores	6	1.8%
Simple prepared cores	15	4.5%
Non-Levallois cores	100	29.9%
Definite Levallois Flakes	6	1.8%
Probable Levallois flakes	0	0.0%
Possible Levallois flakes	1	0.3%
Handaxes	1	0.3%
Non-Levallois flakes	203	60.8%
Flake tools	1	0.3%
Other retouched tools	1	0.3%
Total	334	100%

Table 9.2.1 Material analysed from Rhayat 2.

This study has examined 334 artefacts from Rhayat 2 (see table 9.2.1) all of which are stored in the Syrian National Museum in Damascus.

Taphonomy of lithic assemblage

Cores from Rhayat 2 (n=121)					
Unabraded	81	70.0%	*No edge damage*	15	12.4%
Slightly abraded	31	25.6%	*Slight edge damage*	73	60.3%
Moderately abraded	9	7.4%	*Moderate edge damage*	30	24.8%
Heavily abraded	0	0.0%	*Heavy edge damage*	3	2.5%
Unstained	95	78.5%	*Unpatinated*	5	4.1%
Lightly stained	21	17.4%	*Lightly patinated*	28	23.1%
Moderately stained	5	4.1%	*Moderately patinated*	51	42.2%
Heavily stained	0	0.0%	*Heavily patinated*	37	30.6%
Unscratched	101	83.5%			
Lightly scratched	11	9.1%			
Moderately scratched	8	6.6%			
Heavily scratched	1	0.8%			

Table 9.2.2 Condition of all cores from Rhayat 2.

	Abrasion	Edge Damage	Staining	Patination	Scratching
Rh 2 1563	None	Slight	None	Slight	None

Table 9.2.3 Condition of handaxe from Rhayat 2.

Flakes from Rhayat 2 (n=211)					
Unabraded	188	89.1%	*No edge damage*	7	3.3%
Slightly abraded	22	10.4%	*Slight edge damage*	76	36.0%
Moderately abraded	1	0.5%	*Moderate edge damage*	114	54.0%
Heavily abraded	0	0.0%	*Heavy edge damage*	14	6.7%
Unstained	194	91.9%	*Unpatinated*	1	0.5%
Lightly stained	15	7.1%	*Lightly patinated*	25	11.8%
Moderately stained	2	0.9%	*Moderately patinated*	134	63.5%
Heavily stained	0	0.0%	*Heavily patinated*	51	24.2%
Unscratched	196	92.9%			
Lightly scratched	11	5.2%			
Moderately scratched	4	1.9%			
Heavily scratched	0	0.0%			

Table 9.2.4 Condition of all flakes from Rhayat 2.

Taphonomic studies demonstrate that the artefacts studied from Rhayat 2 share broadly similar physical attributes (see tables 9.2.2, 9.2.3 and 9.2.4). Notably, the vast majority are unabraded or only slightly rolled (97.0%) indicating that most have been subject to only limited fluvial transport - if indeed they have been moved at all. This suggests that the artefacts either originate from a temporary landsurface within the fluvial gravels from which they were recovered, or are from the final surface of these gravels. Either way, there is some suggestion that the material was exposed to sub-aerial processes for a period of time. This is indicated by the edge damage evident on the artefacts (93.4% display some evidence, whilst 48.7% exhibit at least moderate levels), the fact that many are at least moderately patinated (46.4%) and the observation that some display evidence of surface scratching (10.5%).

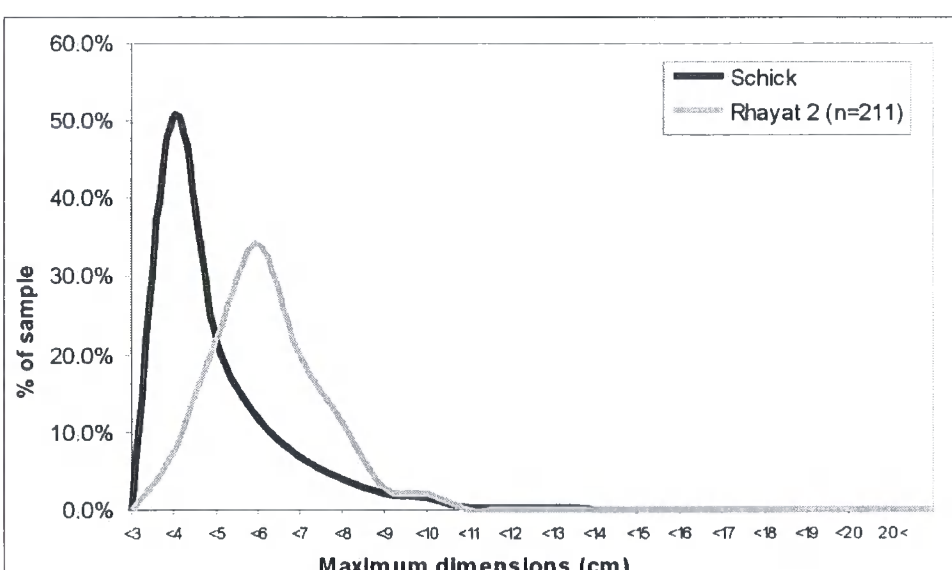

Figure 9.2.2 Comparison of maximum dimension of debitage larger than 2 cm recovered from Rhayat 2 and experimental data generated by Schick (1986).

The impression that the Rhayat 2 assemblage is minimally displaced is further supported by the similarity between the size distribution of flakes in the collection studied with those produced by Schick (1986) during experimental non-prepared core reduction (figure 9.2.2). However, debitage under 5 cm in maximum dimension is under-represented in the Rhayat collection; this is perhaps unsurprising, given that the material was collected from a natural section incised through gravel by a wadi, and not by systematic excavation.

Technology of lithic assemblage

Raw Material

	Levallois cores (n=6)	Simple prepared cores (n =15)	Non-Levallois cores (n=100)	Handaxes (n=1)	Definite Levallois flakes (n=6)	Non-Levallois flakes (n=204)
Raw material						
Fresh	16.7%	13.3%	27.0%	0.0%	0.0%	3.9%
Derived	83.3%	86.7%	67.0%	100%	0.0%	70.1%
Indeterminate	0.0%	0.0%	6.0%	0.0%	100%	26.0%
Blank form						
Nodule	16.7%	33.3%	52.0%	100%	-	-
Shattered Nodule	0.0%	0.0%	2.0%	0.0%	-	-
Flake	0.0%	0.0%	5.0%	0.0%	-	-
Thermal flake	0.0%	0.0%	1.0%	0.0%	-	-
Indeterminate	83.3%	66.7%	40.0%	0.0%	-	-

Table 9.2.5 Raw material and inferred blank form for artefacts studied from Rhayat 2.

The vast majority of artefacts studied from Rhayat 2 were produced on coarse-grained chert/flint. The exceptions to this consist of a single quartzite flake, two quartzite cores, one basalt core and one flake of an unidentified material. Although fluvially derived chert/flint clasts were most frequently employed, a number of artefacts from the site (in particular non-Levallois cores) are produced on fresh material (see table 9.2.5). This is particularly notable as, in contrast to the derived nodules which would have been immediately available amongst the gravels found at the site, the nearest primary sources of chert/flint to Rhayat is located ~50 km to the north-west near Tellik and ~70 km to south in the Jebal Al-Bishri (Ponikarov *et al.* 1966, 30; 1967, 67). Most of the cores and the single handaxe are produced on rounded cobbles (see table 9.2.5).

Levallois Cores

Contra to the observation made by Copeland (2004, table 6), very few (six) cores fully conform to volumetric definition of Levallois flaking (methodological differences are likely to be partly responsible for this anomaly; see chapter 2). Most are diminutive, round in planform and fairly thin when discarded (see table 9.2.6), with the result that all but one can be said to be completely exhausted. Notably, the single example which, although small, retains some reductive potential is the only example produced on fresh (i.e. not immediately available) raw material. This was probably picked-up, carried around and exploited in the surrounding landscape.

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Rh 2 1559	59.6	42.3	20.4	60	0.71	0.34
Rh 2 1694	65.3	49.7	21.2	82	0.76	0.32
Rh 2 1340	54.7	53.3	22.6	68	0.97	0.41
Rh 2 1626	58.5	58.2	35.1	94	0.99	0.60
Rh 2 1398	77.7	64.0	21.6	106	0.82	0.28
1629	48.2	55.6	21.2	45	1.15	0.44

Table 9.2.6 Rhayat 2 Levallois cores summary statistics.

Levallois cores; technological observations (n=6)					
Preparation method (n=6)			Exploitation method (n=6)		
Unipolar	1	16.7%	*Unexploited*	1	16.7%
Bipolar	1	16.7%	*Lineal*	4	66.6%
Convergent Unipolar	2	33.3%	*Failed*	1	16.7%
Centripetal	2	33.3%			
Preparatory scars on flaking surface (n=6)			Preparatory scars on striking platform (n=6)		
1-5	4	66.7%	1-5	3	50.0%
6-10	2	33.3%	6-10	3	50.0%
>10	0	0.0%	>10	0	0.0%
Position of cortex on striking platform (n=6)			Percentage cortex on striking surface (n=6)		
None	0	0.0%	0	0	0.0%
One edge only	1	16.7%	1-25%	0	0.0%
More than one edge	1	16.7%	26-50%	2	33.3%
All over	3	50.0%	51-75%	2	33.3%
Central	1	16.7%	>75%	2	33.3%
Lev. products from final flaking surface (n=6)			Types of Levallois products from core (n=6)		
0	2	33.3%	*Flake*	3	50.0%
1	6	66.7%	*Point*	1	16.7%
			None	2	33.3%
Earlier flaking surface (n=6)					
Yes	0	0.0%			
No	6	100%			
			Dimension of final Levallois products (n=5)		
Remnant distals on striking platform (n=6)			*Min Length* 24.9	*Min. Breadth*	25.7
Yes	0	0.0%	*Max. Length* 59.2	*Max. Breadth*	51.3
No	6	100%	*Mean Length* 43.8	*Mean Breadth*	36.4

Table 9.2.7 Technological observations for Levallois cores from Rhayat 2.

The remaining five Levallois cores from Rhayat are produced on fluvially derived clasts immediately available at the site. The fact that they are all exhausted suggests that they are from the far end of the reduction spectrum, as does the fact that one is re-prepared but unexploited, whilst a second was discarded following an unsuccessful attempt to detach a final preferential removal (table 9.2.7). However, there is also some indication that the blanks on which these cores were produced were not much larger than the artefacts themselves at the point of discard, with the consequence that their reductive potential was, from the first, limited. This contention is suggested by the fact that, despite being exhausted, all the Levallois cores from the site lack evidence of remnant distals on the striking surface (table 9.2.7). Consequently, a situation can be envisaged in which the five exhausted Levallois cores from Rhayat can be attributed to the preparation and removal of a limited number of preferential flakes from cores produced on the small river pebbles immediately available at the site, which were then also discarded at the locale once their reductive potential had been exhausted.

Simple Prepared Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	56.3	47.6	21.8	70.2	0.88	0.47
Median	53.9	44.4	21.8	72.0	0.79	0.45
Min.	41.8	36.0	10.0	30.0	0.60	0.18
Max.	84.6	62.0	33.4	123.0	1.30	0.68
St.Dev.	12.7	8.1	5.9	27.3	0.23	0.14

Table 9.2.8 Rhayat 2 simple prepared cores summary statistics (n=15).

Simple prepares cores; technological observations (n=15)						
Exploitation method (n=15)			Preparatory scars on striking platform (n=15)			
Lineal	8	53.3%	1-5		12	80.0%
Unipolar recurrent	4	26.7%	6-10		3	20.0%
Bipolar recurrent	2	13.3%	>10		0	0.0%
Centripetal recurrent	1	6.7%				
Percentage cortex on striking surface (n=15)			Position of cortex on striking platform (n=15)			
0	0	0.0%	*All over*		10	66.6%
1-25%	1	6.7%	*Central*		1	6.7%
26-50%	0	0.0%	*Central and more than one edge*		4	26.7%
51-75%	5	33.3%				
>75%	9	60.0%	Dimension of final Levallois products (n=14)			
			Min. Length	30.8	*Min. Breadth*	25.7
Products from final flaking surface (n=15)			*Max. Length*	64.6	*Max. Breadth*	51.3
0	2	13.3%	*Mean Length*	46.7	*Mean Breadth*	33.4
1	10	66.7%				
2	3	20.0%	Remnant distals on striking platform (n=15)			
3	0	0.0%	*Yes*		0	0%
4	0	0.0%	*No*		15	100%

Table 9.2.9 Technological observations for simple prepared cores from Rhayat 2.

Twelve simple prepared cores which possess all the features of Boëda's (1986, 1995) volumetric definition of the Levallois method (see chapter three), but lack evidence for deliberate configuration of the flaking surface were identified amongst the material studied from Rhayat 2. Like the "classic" Levallois cores from the site these tend to be diminutive, round in planform and fairly thin when discarded (see table 9.2.8). Two are on fresh raw material indicating that they were brought into the site from elsewhere in the landscape. The remainder are on derived blanks, such as those that were immediately available. Despite being very small and relatively flat, exactly a third of the cores retain the form of the original blank selected (table 9.2.9). This suggests that many of the nodules on which they were produced were not much larger than the cores themselves at the point of discard. It also seems clear that, save for the two examples on fresh raw material, the simple prepared cores reflect the flaking of small river cobbles immediately available at the site, which were discarded once their reductive potential was exhausted. Futhermore, it is arguable that the relative high frequency of simple prepared cores in relation to "classic" Levallois cores is a direct product of the small volume of the clasts available to the Rhayat knappers, which prohibited extensive surface shaping.

Levallois Products

	Type	Portion	Butt	Prep. scars	Prep. method	Exploit. method	Length (mm)	Breadth (mm)	Thick. (mm)	Elong. (B/L)
1	Flake	Whole	Dihedral	4	Converg. Unipolar	Lineal	46.5	33.3	9.1	0.72
2	Flake	Whole	Facetted	3	Centrip.	Lineal	48.1	45.6	6.9	0.95
3	Flake	Whole	Facetted	4	Converg. Unipolar	Lineal	50.8	26.9	8.8	0.53
4	Ind.	Prox.	Facetted	3	Centrip.	Lineal	43.5	34.9	9.5	0.80
5	Flake	Whole	Facetted	4	Centrip.	Lineal	57.5	41.1	13.9	0.71
6	Point	Whole	Chap. de Gend.	6	Converg. Unipolar	Lineal	57.9	53.5	11.8	0.92

Table 9.2.10 Summary statistics and technological observations for definite Levallois products from Rhayat 2.

Six definite Levallois products were identified amongst the artefacts from Rhayat 2, four flakes, one point and a proximal fragment (table 9.2.10). All are the product of either convergent unipolar or centripetal core preparation and are lineal removals that do not retain any evidence of previous Levallois flake scars. They are relatively small and, as such, could potentially have come from the Levallois cores from the site.

Non-Levallois Cores

	Non-Levallois cores on fresh chert/flint (n=27)		Non-Levallois cores on derived chert/flint (n=66)	
	Maximum dimensions (mm)	Weight (grams)	Maximum dimensions (mm)	Weight (grams)
Mean	58.8	94.0	60.9	94.5
Median	58.0	75.0	61.0	84.0
Min	40.6	24.0	36.4	18.0
Max	80.0	325.0	92.1	336.0
St.Dev.	9.8	62.4	12.4	60.2

Table 9.2.11 Rhayat 2 non-Levallois cores summary statistics (fragment and decorticated cores excluded).

Non-Levallois cores on fresh chert/flint; technological observations (n=27)					
Overall core reduction (n=27)			Core episodes (n=47)		
Migrating platform cores	11	40.8%	*Type A: Single Removal*	6	12.8%
Single platform unprepared	13	48.1%	*Type B: Parallel flaking*	11	23.4%
Opposed platform unprepared	1	3.7%	*Type C: Alternate flaking*	25	53.2%
Discoidal	2	7.4%	*Type D: Unattributed removal*	5	10.6%
Fragment	0	1.0%			
Flake scars/core (n=27)			Core episodes/core		
1-5	18	66.7%	*Min*	1	-
6-10	9	33.3%	*Max*	4	-
>11	0	0.0%	*Mean*	1.7	-
Max.	10	-			
Mean	4.7	-	Flake scars/core episode		
			Min.	1	-
% Cortex (n=27)			*Max.*	8	-
0	0	0.0%	*Mean*	2.7	-
10-25%	0	0.0%			
26-50%	12	44.4%	Blank form retained? (n=27)		
51-75%	14	51.9%	*Yes*	17	63.0%
>75%	1	3.7%	*No*	10	37.0%

Table 9.2.12 Technological observations for non-Levallois cores on fresh chert/flint from Rhayat 2.

Non-Levallois cores on derived chert/flint; technological observations (n=67)					
Overall core reduction (n=67)			Core episodes (n=161)		
Migrating platform cores	41	61.2%	*Type A: Single Removal*	16	9.9%
Single platform unprepared	17	25.4%	*Type B: Parallel flaking*	21	13.0%
Opposed platform unprepared	4	6.0%	*Type C: Alternate flaking*	75	46.6%
Discoidal	4	6.0%	*Type D: Unattributed removal*	49	30.4%
Fragment	1	1.4%			
Flake scars/core (n=66)			Core episodes/core		
1-5	28	42.4%	*Min.*	1	-
6-10	29	44.0%	*Max.*	6	-
11-15	7	10.6%	*Mean*	2.5	-
>15	1	1.5%			
Obscured	1	1.5%	Flake scars/core episode		
Max.	16	-	*Min.*	1	-
Mean	6.4	-	*Max.*	9	-
			Mean	2.7	-
% Cortex (n=66)					
0	0	0.0%	Blank form retained? (n=66)		
10-25%	5	7.6%	*Yes*	34	51.5%
26-50%	36	54.5%	*No*	31	47.0%
51-75%	22	33.3%	*Obscured*	1	1.5%
>75%	2	3.0%			
Obscured	1	0.6%			

Table 9.2.13 Technological observations for non-Levallois cores on derived chert/flint from Rhayat 2.

Notably a significant proportion of the non-Levallois cores from Rhayat 2 (27.0%; table 9.2.5) are on raw material which would not have been directly available at the site (i.e. chert/flint from a primary bedrock source). Furthermore, although broadly the same size (see table 9.2.11), technological differences are apparent between the non-Levallois cores on material not immediately available at the site, and those on blanks which could potentially have been obtained from the river gravels (see tables 9.2.12 and 9.2.13; the six completely decorticated non-Levallois cores have been excluded from this analysis).

The major difference between the two non-Levallois core assemblages is the fact that those produced on immediately available raw material were generally more intensively worked. Although the number of flake scars per core episode is similar (average for both = 2.7), the working of cores produced on derived raw material involved increased numbers of core episodes (mean of 2.5, opposed to 1.7). This is also reflected by the fact that those on river-worn blanks tend to possess more flake scars (average of 6.4, opposed to 4.7). This increased flaking intensity is further emphasized by the fact that proportionally more unattributed removals (reflective of the over-printing of previous episodes of flaking) are apparent on cores produced on derived raw material (30.4% of total core episodes, opposed to 10.6%), and by the observation that such cores tend to retain less cortex (36.3% of the those on derived blanks retain cortex on >50% their surface area, compared with 55.6% of fresh cores). This resulted in proportionally fewer retaining the form of the original blank (51.5%, opposed to 63.0%). Nodular blanks dominate both groups of non-Levallois cores (see table 9.2.5). Given that those on derived raw material have clearly been subject to more intensive reduction, it is notable that both sets of cores are broadly the same size, as it indicates that although both groups are on restricted blanks, those obtained from a source of fresh raw material were particularly small. This observation may also account for the comparatively elevated proportion of cores on fresh raw material worked from only a single platform (48.1%, opposed to 25.4%).

The data suggests that two different approaches to non-Levallois core working are evident at Rhayat 2. Cores on immediately available raw material reflect the maximisation of flake production at the site. In contrast, those cores on non-local raw material represent blanks which have been less intensively worked, but utilised in the wider landscape and discarded at Rhayat 2 where a source of new (and slightly larger) blanks were available.

Handaxes

	Length (mm)	**Breadth (mm)**	**Thickness (mm)**	**Refinement (Th/B)**
Rh 2 1563	82.5	48.9	38.9	0.80

Table 9.2.14 Rhayat 2 handaxe summary statistics.

The single handaxe identified amongst the material studied from Rhayat 2 is of medium size, unrefined and pointed (see table 9.2.14 and figure 9.2.3). In terms of condition, it is similar to the bulk of the material from the site, and does not display any evidence of fluvial modification. It retains large amounts of cortex and is the product of hard hammer flaking of a medium-sized river cobble.

Figure 9.2.3 Photograph of handaxe from Rhayat 2.

Non-Levallois Flakes

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	48.1	36.1	13.5
Median	47.3	34.6	12.7
Min.	23.9	14.9	4.2
Max.	86.8	71.3	34.8
St.Dev.	13.6	9.7	5.2

Table 9.2.15 Rhayat 2 non-Levallois flakes summary statistics (n=148, fragments excluded - combined data).

The non-Levallois flakes analysed from Rhayat 2 tend to be small (see table 9.2.15) and produced exclusively using a hard percussor (table 9.2.16). Significantly, they possess few flake scars (80.4% has three or less) and often display uncomplicated dorsal scar patterns (39.2% possess uni-directional scar patterns) suggesting that, like the cores, they are the product of a restricted approach to reduction. In addition, the majority display remnant cortex indicative of the exploitation of derived chert/flint, a source of which was immediately available (see table 9.2.5). This lends support to the assertion that, in the main, cores on derived raw material were flaked at the site. Interestingly, however, eight flakes retain fresh/chalky cortex on their dorsal surface and, as such, must have been detached from blocks brought into the site from elsewhere in the wider landscape.

Flakes; technological observations (n=204)					
Portion (n=204)			Dorsal scars (n=148)		
Whole	148	72.5%	0	25	16.9%
Proximal	18	8.8%	1	39	26.4%
Distal	22	10.8%	2	27	18.2%
Mesial	5	2.5%	3	28	18.9%
Siret	11	5.4%	4	16	10.8%
			5	7	4.7%
			>5	5	3.4%
			Obscured	1	0.7%
Dorsal cortex retention (n=148)			Dorsal scar pattern (n=148)		
100%	25	16.9%	*Uni-directional*	58	39.2%
>50%	24	16.2%	*Bi-directional*	2	1.4%
<50%	76	51.4%	*Multi-directional*	62	41.9%
0%	22	14.9%	*Wholly cortical*	25	16.9%
Obscured	1	0.7%	*Obscured*	1	0.7%
Butt type (n=204)			Hammer mode (n=204)		
Plain	58	28.4%	*Hard*	199	97.5%
Dihedral	10	4.9%	*Soft*	0	0.0%
Cortical	44	21.6%	*Indeterminate*	5	2.5%
Natural (but non-cortical)	4	2.0%			
Marginal	9	4.4%	Relict core edge(s) (n=148)		
Mixed	6	2.9%	*Yes*	50	33.8%
Soft hammer	0	0.0%	*No*	97	65.5%
Facetted	6	2.9%	*Obscured*	1	0.7%
Obscured	42	20.6%			
Missing	25	12.3%			

Table 9.2.16 Technological observations for non-Levallois flakes from Rhayat 2.

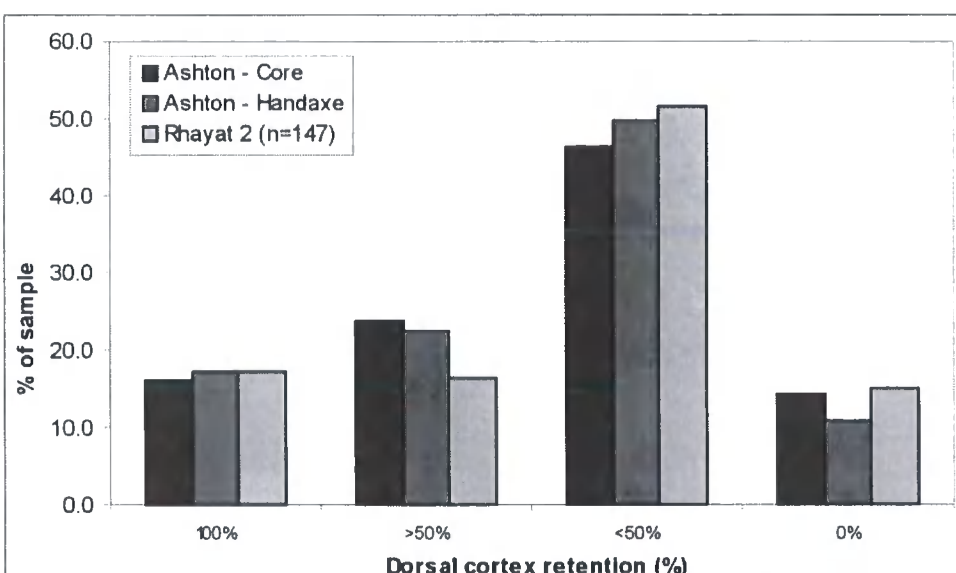

Figure 9.2.4 Comparison of percentage dorsal cortex rentention on non-Levallois flakes from Rhayat 2, and experimental data generated by Ashton (1998b) for core and handaxe reduction.

Notably, comparison between cortex retention on the non-Levallois flake assemblage from Rhayat 2 with Ashton's (1998b) experimental data for flakes produced during core and handaxe reduction has produced a good correlation between the archaeological and experimental datasets (figure 9.2.4). This indicates that complete knapping sequences are present amongst the debitage from the Rhayat, supporting the suggestion that extended core working occurred at the site.

Retouched Tools

Figure 9.2.5 Photograph of "borer" or bec from Rhayat 2.

Two retouched artefacts were identified amongst the material studied from Rhayat 2. One is a flake with a thinned butt, while the other consists of a nodule which has been worked to form a "borer"or bec (see figure 9.2.5).

Technology and Hominin Behaviour

The material studied from Rhayat 2 is associated with fluvial gravels and constitutes a time-averaged palimpsest, reflecting ongoing technological practices at the site and within the wider landscape over an unknown period. Although a single handaxe was recovered, the assemblage is dominated by two technological strategies; Levallois/simple prepared core working and a more *ad hoc* approach to flaking, both of which illustrate aspects of hominin technological strategies at the site itself and further afield.

Both the Levallois and simple prepared cores from the site hint at a complex use of landscape; some very exhausted cores in both assemblages were probably carried around and exploited in the wider region. However, such cores only constitute a small part of both datasets, the majority of which reflect the maximisation of flake production from small clasts that were immediately available at the site. The suggestion that extensive blank reduction occurred at the locale is supported by the flake data. Significantly, simple prepared cores heavily outnumber Levallois cores amongst the material studied from Rhayat, a fact which seems directly attributable to the small size of the blanks available. These appear to frequently have been too small to allow for the production of useable flakes through repeated exploitation and re-preparation of a flaking surface. Interestingly, a similar picture emerges from non-Levallois core data from the site. Although the majority of these cores reflect the limited exploitation of immediately available clasts, a relatively high proportion were clearly brought into the site from elsewhere. The single handaxe studied from the site suggests that handaxe manufacture also formed part of the Rhayat knappers' repertoire. The fact that only one isolated example was noted may be related to the fact the nodules available are generally very small and did not permit regular handaxe production.

In short, Rhayat 2 can be characterized as a point in the landscape at which hominins extracted and extensively worked the immediately available gravels. Futhermore, it also appears to be a place at which other material that had been obtained and used in the wider landscape was discarded. Such palimpsest repositories of human activity are hard to disentangle, but do point towards a complex and flexible approach to technology, acting as a nodal point within variable hominin itineraries.

9.3 Chnine East 1

Location & History of Investigation

A sizeable collection of typo-technologically Middle Palaeolithic artefacts (n=720) was collected during the course of the 1978 RCP 438 survey (see chapter 7), from the surface of terrace gravels located north of a road bridge which crosses the Balikh river at Chnine (Copeland 2004, 30, Hours 1979, 13). The site, referred to as Chnine East 1, is located near Rhayat 2 (see section 9.2), but on the opposite (east) bank of the river (see figure 9.2.1). Similar artefacts had previously been recovered from terrace surfaces in this area by Michel Malenfant in 1969 (Malenfant 1976; see chapter 7), although the exact locations of these discoveries are unknown.

Geological Background & Preferred Dating

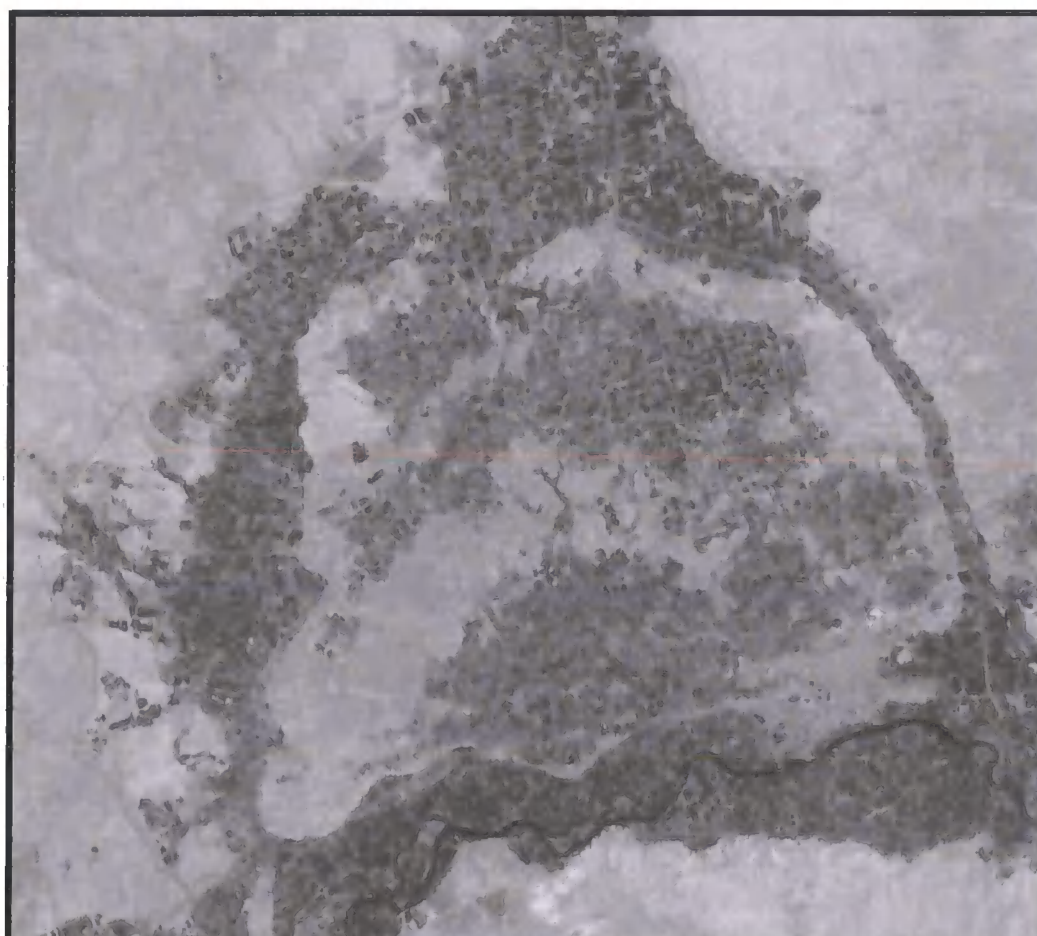

Figure 9.3.1 Landsat ETM+ image of area of the Euphrates Valley between Tabaqah and Raqqa illustrating ancient meander loop of the Euphrates.

The Pleistocene deposits recorded at Chnine East 1 are located ~40 m above the River Balikh and have been correlated with Qf III deposits found in the Euphrates Valley (Besançon and Sanlaville 1981, figure 7). Indeed, these deposits may have been laid down by the paleo-Euphrates, as Landsat satellite imagery suggests that an abandoned meander loop of that river can be discerned in this area, that was probably active when these deposits were laid down (Demir *et al.* 2007b, 19; see figure 9.3.1). This being so, the fluvial deposits found at Chnine East 1 are likely to be of considerable antiquity; Ar-Ar dating of basalt flows overlying Qf III deposits at a similar altitude ~75 km downstream at Halabiyeh and Zalabiyeh indicates these were deposited during and prior to the early Pleistocene (Demir *et al.* 2007b; see chapter seven, section 7.3). However, no specific age estimate is currently available for the Chnine East 1 gravels. In any case, as all the artefacts studied were recovered from the surface of the fluvial deposits and are generally unabraded (see below), most are likely to post-date their deposition, having been discarded on the surface of the gravel during an unknown period. The exceptions to this are the small number of moderately and heavily abraded flakes and cores which may be broadly contemporary with the Chnine East gravels.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	No. of artefacts	% of total
Levallois cores	12	1.8%
Simple prepared cores	19	3.0%
Retouched simple prepared cores	1	0.2%
Non-Levallois cores	184	28.5%
Definite Levallois Flakes	3	0.5%
Probable Levallois flakes	1	0.2%
Retouched probable Levallois flake	1	0.2%
Possible Levallois flakes	2	0.3%
Handaxes	0	0.0%
Non-Levallois flakes	418	65.0%
Retouched non-Levallois flake	2	0.3%
Total	643	100%

Table 9.3.1 Material analysed from Chnine East 1.

A total of 643 artefacts from Chnine East 1 have been analysed in this study (see table 9.3.1). All are located amongst the collections of the Syrian National Museum in Damascus.

Taphonomy of lithic assemblage

The vast majority of the artefacts studied from Chnine East 1 do not show signs of fluvial modification (i.e. are in fresh condition, or are only slightly abraded; see tables 9.3.2 and 9.3.3). The exceptions to this are three cores and thirteen flakes which are at least moderately abraded. This small, derived assemblage presumably originates from the gravels, in contrast to the bulk of the material which can be ascribed to the surface of the fluvial deposits. Further analysis has focussed on this surface material. The suggestion that much of the material from Chnine East 1 has lain on the surface for a considerable period of time is supported by the significant number of artefacts (36.2%) which, whilst not generally fluvially damaged, display at least moderate levels of edge damage, potentially indicative of surface trampling. Futhermore, some artefacts (6.7%) retain evidence of surface scratching, suggesting that they have undergone exposure to sub-aerial processes; the fact that nearly half (41.8%) are moderately or heavily patinated may also reflect this.

Cores from Chnine East 1 (n=216)					
Unabraded	181	83.8%	*No edge damage*	24	11.1%
Slightly abraded	32	14.8%	*Slight edge damage*	157	72.7%
Moderately abraded	3	1.4%	*Moderate edge damage*	33	15.3%
Heavily abraded	0	0.0%	*Heavy edge damage*	2	0.9%
Unstained	167	77.3%	*Unpatinated*	27	12.5%
Lightly stained	40	18.5%	*Lightly patinated*	97	44.9%
Moderately stained	8	3.7%	*Moderately patinated*	63	29.2%
Heavily stained	1	0.5%	*Heavily patinated*	29	13.4%
Unscratched	185	85.6%			
Lightly scratched	16	7.4%			
Moderately scratched	14	6.5%			
Heavily scratched	1	0.5%			

Table 9.3.2 Condition of cores from Chnine East 1.

Flakes from Chnine East 1 (n=427)					
Unabraded	363	85.0%	*No edge damage*	23	5.4%
Slightly abraded	51	11.9%	*Slight edge damage*	206	48.2%
Moderately abraded	2	0.5%	*Moderate edge damage*	176	41.2%
Heavily abraded	11	2.6%	*Heavy edge damage*	22	5.2%
Unstained	360	84.3%	*Unpatinated*	84	19.7%
Lightly stained	40	9.4%	*Lightly patinated*	166	38.9%
Moderately stained	13	3.0%	*Moderately patinated*	141	33.0%
Heavily stained	14	3.3%	*Heavily patinated*	36	8.4%
Unscratched	415	97.2%			
Lightly scratched	5	1.2%			
Moderately scratched	7	1.6%			
Heavily scratched	0	0.0%			

Table 9.3.3 Condition of flakes from Chnine East 1.

The assertion that the bulk of the material from Chnine East 1 was deposited on the surface of the gravels, and was not subject to fluvial displacement, is reinforced by the generally good correlation between the size distribution of flakes in the collection studied with that produced by Schick (1986) during experimental non-prepared core reduction (figure 9.3.2). Flakes under 5 cm in maximum dimension are, however, under-represented in the assemblage, but this is perhaps unsurprising, given that the material was collected from a landsurface, and not through systematic excavation.

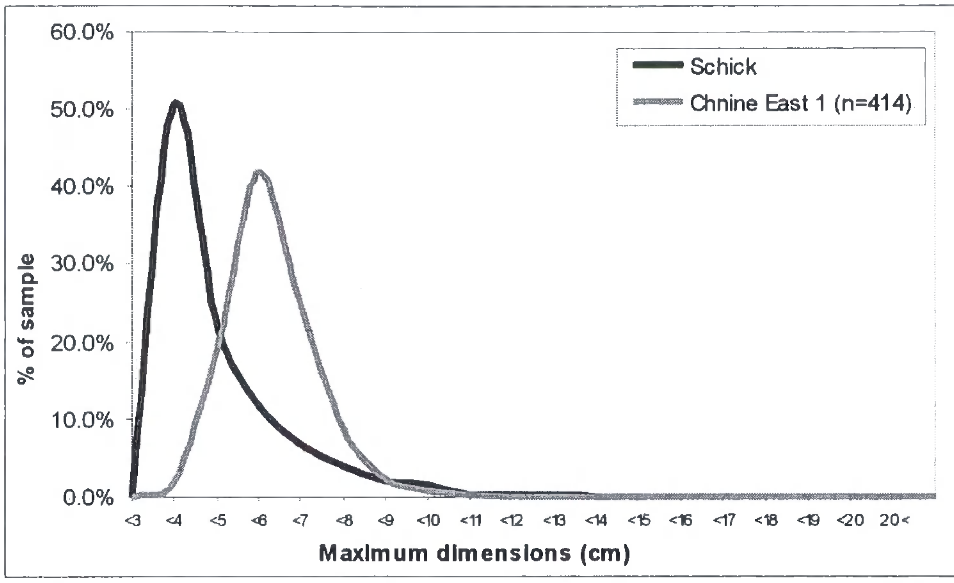

Figure 9.3.2 Comparison of maximum dimension of fresh/slightly abraded debitage larger than 2 cm recovered from Chnine East 1 and experimental data generated by Schick (1986).

Technology of lithic assemblage

Raw Material

	Levallois cores (n=12)	Simple prepared cores (n=20)	Migrating platform cores (n=81)	Discoidal cores (n=21)	Single platform cores (n=73)	Other cores (n=6)	Flakes (n=414)
Raw							
Fresh	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%
Derived	100%	100%	98.8%	95.5%	100%	100%	86.0%
Indeterminate	0.0%	0.0%	1.2%	4.5%	0.0%	0.0%	12.3%
Blank form							
Nodule	41.7%	55.0%	53.1%	14.3%	78.1%	66.7%	-
Shattered	0.0%	0.0%	0.0%	0.0%	4.1%	0.0%	-
Flake	0.0%	0.0%	1.2%	4.7%	2.7%	0.0%	-
Thermal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-
Indeterminate	58.3%	45.0%	45.7%	81.0%	15.1%	33.3%	-

Table 9.3.4 Raw material and inferred blank form for artefacts studied from Chnine East 1.

The artefacts studied from Chnine East 1 are all produced on coarse-grained chert/flint nodules which, judging from the remnant cortex, were almost exclusively obtained from river gravel. The likely source of these blanks are the fluvial deposits found at the site (see table 9.3.4). Interestingly, however, seven unmodified non-Levallois flakes retain fresh cortex on their dorsal surfaces. This is notable as the nearest primary source of chert/flint is located ~50 km to the north-west of Chnine (Ponikarov *et al.* 1966, 30; 1967, 67). Consequently, this suggests that these flakes were brought into the site after being produced and carried through the wider landscape.

Levallois Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	53.3	49.1	24.7	71.4	0.94	0.51
Median	51.6	47.4	24.7	70.0	0.95	0.52
Min.	43.0	43.9	18.1	34.0	0.71	0.35
Max.	66.9	64.0	33.2	122.0	1.25	0.70
St.Dev.	7.8	5.5	4.3	22.0	0.15	0.10

Table 9.3.5 Chnine East 1 Levallois cores summary statistics (n=12).

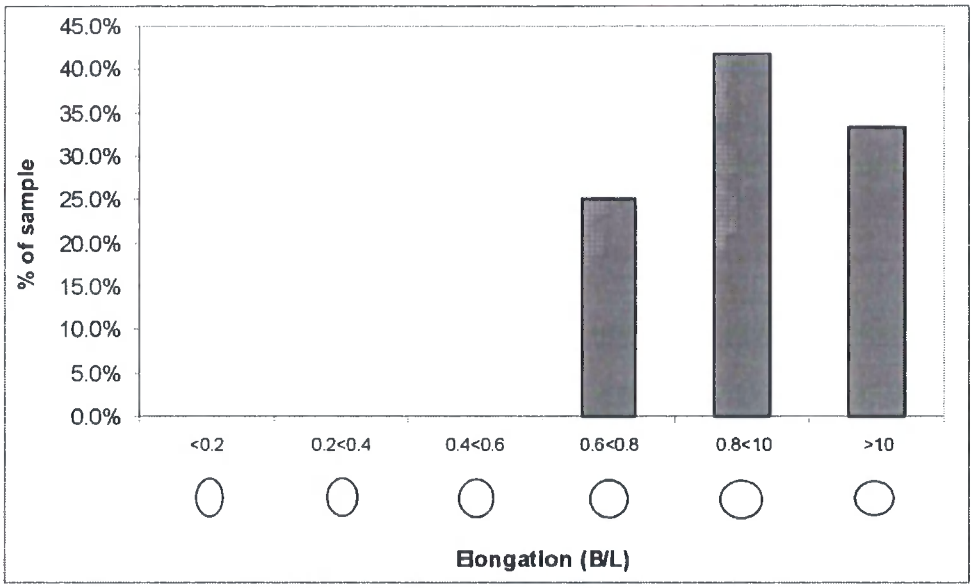

Figure 9.3.3 Elongation of Levallois cores from Chnine East 1 (n=12).

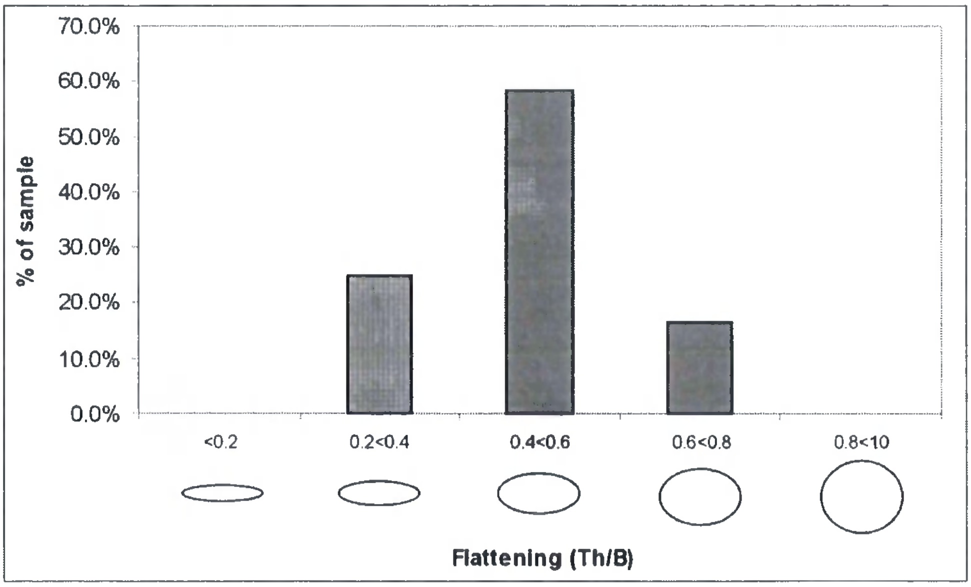

Figure 9.3.4 Flattening of Levallois cores from Chnine East 1 (n=12).

Twelve Levallois cores are present amongst the artefacts studied from Chnine East 1. These tend to be very small (see table 9.3.5) and circular in planform (see figure 9.3.3). Although many were fairly flat when discarded, a significant proportion of the assemblage clearly retain enough volume to allow for further working (see figure 9.3.4). However, given their extremely small size, any further Levallois removals obtained following the reconfiguration of the flaking surface of these cores would have been diminutive. The fact that further working was not undertaken is significant, as it suggests that larger Levallois products were desired by the Chnine East 1 knappers.

Levallois cores; technological observations (n=12)					
Preparation method (n=12)			Exploitation method (n=12)		
Bipolar	1	8.3%	*Unexploited*	1	8.3%
Convergent unipolar	1	8.3%	*Lineal*	8	66.7%
Centripetal	10	83.4%	*Unipolar recurrent*	2	16.7%
			Failed	1	8.3%
Preparatory scars on flaking surface (n=12)			Preparatory scars on striking platform (n=12)		
1-5	10	83.3%	1-5	8	66.7%
6-10	2	16.7%	6-10	4	33.3%
>10	0	0.0%	>10	0	0.0%
Position of cortex on striking platform (n=12)			Percentage cortex on striking surface (n=12)		
None	0	0.0%	0	0	0.0%
One edge only	1	8.3%	1-25%	2	16.7%
All over	4	33.4%	26-50%	1	8.3%
Central	1	8.3%	51-75%	6	50.0%
Central and one edge	3	24.0%	>75%	3	25.0%
Central and more than one edge	3	25.0%			
Levallois products from flaking surface (n=12)			Types of Levallois products from core (n=12)		
0	1	8.3%	*Unexploited*	1	8.3%
1	9	75.0%	*Flake*	10	83.3%
2	2	16.7%	*Failed removal*	1	8.3%
Earlier flaking surface (n=12)					
Yes	0	0.0%			
No	12	100%			
			Dimension of final Levallois products (n=11)		
Remnant distals on striking platform (n=12)			*Mean Length* 42.8	*Mean Breadth*	36.4
Yes	0	0.0%	*Min. Length* 35.3	*Min. Breadth*	27.1
No	12	100%	*Max. Length* 52.3	*Max. Breadth*	52.3

Table 9.3.6 Technological observations for Levallois cores from Chnine East 1.

The technological attributes of the Levallois cores from Chnine East 1 are summarized in table 9.3.6. Most display evidence of centripetal preparation, which may indicate cores subject to a final phase of exploitation before discard (*cf.* Baumler 1988, Meignen and Bar Yosef 1991, Hovers 1998). This is particularly significant as all the Levallois cores from Chnine East 1 are on derived river cobbles, such as those that were immediately available at the site (see table 9.3.4). Together, these observations suggest that the complete *chaîne opératoire* for these cores, from raw material procurement to discard, occurred at the site. However, as those studied possess limited reductive potential, it is also possible that other Levallois cores with a greater capacity for further productive flaking surfaces were taken away from the site to be used elsewhere.

Interestingly, in addition to their potential productivity being compromised at the point of discard, it appears that the Levallois cores studied from Chnine East 1 were produced on blanks whose reductive possibilities were, from the first, restricted. This is illustrated by the fact that the nodules on which these cores were produced seem to have been not much larger than the cores themselves at the point of discard, as they generally possesses less than six flake scars (66.7%), and retain high levels of cortex on their striking platforms (75% retain cortex on >50% of this surface). Futhermore, their striking platform surfaces do not display the remnant distal ends of flake scars. Consequently, flaking of the Levallois cores from Chnine East 1 is characterized by the removal of a limited number of preferential flakes from small, immediately available river pebbles, whose form only allowed for the production of a few productive flaking surfaces (perhaps just one, as there is no evidence of any core having possessed an earlier flaking surface).

Simple Prepared Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	50.2	46.9	22.2	57.8	0.95	0.47
Median	49.1	47.1	22.3	58.0	0.95	0.49
Min.	39.7	34.2	10.0	20.0	0.61	0.25
Max.	68.8	57.3	31.5	103.0	1.21	0.63
St.Dev.	7.5	6.6	5.6	24.9	0.14	0.10

Table 9.3.7 Chnine East 1 simple prepared cores summary statistics (n=20).

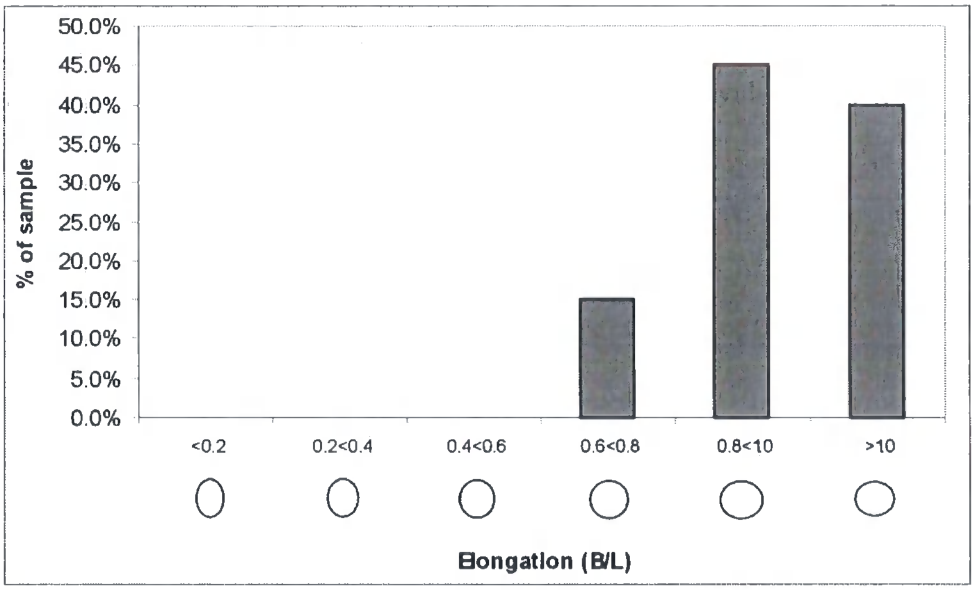

Figure 9.3.5 Elongation of simple prepared cores from Chnine East 1 (n=20).

A total of 22 simple prepared cores were analysed from Chnine East 1 which, like the Levallois cores from the site, tend to be diminutive (see table 9.3.7) and round in planform (see figure 9.3.5). They are as flat as the Levallois cores, many being fairly thin when discarded, indicating that they had been extensively reduced; further reduction of a proportion of the assemblage was also possible (see figure 9.3.6). The fact that, by definition, simple prepared cores do not involve extensive preparation of a flaking surface means that (unlike Levallois cores of similar morphology) the removal of further flakes from the surface of the thicker simple prepared cores from Chnine East 1 could have been achieved without producing notably smaller end-products. However, as simple prepared cores use the natural convexities of the nodule in order to remove flakes (see chapter three), it is arguable that producing further flakes from the cores studied would require the re-imposition of these natural convexities through flaking (which would make the core conform to the volumetric definition of a "classic" Levallois core). If this had been attempted, it *would*, therefore, have resulted in the production of very small products. Therefore, the simple prepared cores from Chnine East 1, like the fully Levallois examples, reflect a similar emphasis upon at least medium-sized flake production.

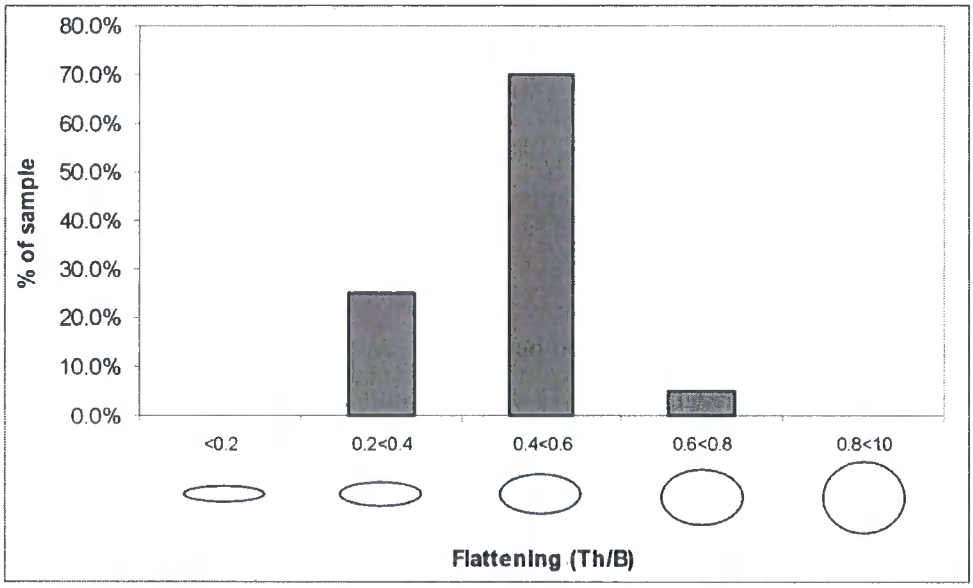

Figure 9.3.6 *Flattening of simple prepared cores from Chnine East 1 (n=20).*

Table 9.3.8 illustrates the technological observations recorded for the simple prepared cores from Chnine East 1. Notably, despite being very small and relatively flat, over half (55.5%) of these cores retain the form of the blank on which they were produced (see table 9.3.4) suggesting that the nodules used were not much larger than the cores themselves when discarded. Furthermore, all these cores are on derived river cobbles, which were immediately available at the site (see table 9.3.4). Consequently, as with the Levallois cores from Chnine East 1, the complete *chaîne opératoire*, from raw material procurement to discard, seems to have occurred at the site (although again, this does not preclude other simple prepared cores worked at the site having been taken away from the site to be exploited further afield).

Simple prepares cores; technological observations (n=20)					
Exploitation method (n=20)			Preparatory scars on striking platform (n=20)		
Lineal	14	70.0%	1-5	19	95.0%
Unipolar recurrent	3	15.0%	6-10	1	5.0%
Bipolar recurrent	2	10.0%	>10	0	0.0%
Centripetal recurrent	1	5.0%			
Percentage cortex on striking surface (n=20)			Position of cortex on striking platform (n=20)		
0	0	0.0%	*None*	0	0.0%
1-25%	0	0.0%	*All over*	19	95.0%
26-50%	1	5.0%	*Central and more than one edge*	1	5.0%
51-75%	16	80.0%			
>75%	3	15.0%			
Products from final flaking surface (n=20)			Dimension of final products (n=20)		
0	0	0.0%	*Mean Length* 40.1	*Mean Breadth*	31.5
1	14	70.0%	*Min. Length* 28.0	*Min. Breadth*	18.2
2	5	25.0%	*Max. Length* 56.7	*Max. Breadth*	44.9
>2	1	5.0%			
			Remnant distals on striking platform (n=20)		
			Yes	0	0%
			No	20	100%

Table 9.3.8 Technological observations for simple prepared cores from Chnine East 1.

It seems that, although analytically separated, the "classic" Levallois and the simple prepared cores from Chnine East 1 actually formed part of the same technological strategy. Both assemblages are characterized by the removal of a limited number of products from the surface of cores produced on small, immediately available river pebbles, the shape of which only allowed a limited number of (frequently a single) productive flaking surfaces to be exploited. This is notable, as it arguably accounts for the comparative numerical dominance of simple prepared cores over classic Levallois cores in the assemblage from Chnine East 1. This is because the form of the nodules available at the site seems frequently to have possessed natural convexities which allowed for a single phase of exploitation, and which were often too small to allow this surface to be re-prepared and exploited again; this would have resulted in the production of diminutive products.

Levallois Products

	Type	Portion	Butt	Prep. scars	Prep. method	Exploit. method	Length (mm)	Breadth (mm)	Thick. (mm)	Elong. (B/L)
1	Flake	Whole	Obscured	5	Bipolar	Lineal	61.8	37.9	11.4	0.61
2	Flake	Whole	Plain	4	Unipolar	Lineal	59.8	39.2	11	0.66
3	Point	Whole	Chap. de Gend.	6	Centrip.	Lineal	59.4	32.8	10.3	0.55

Table 9.3.9 Summary statistics and technological observations for definite Levallois products from Chnine East 1.

Only three definite Levallois products were identified amongst the artefacts from Chnine East 1; two flakes and one point (see table 9.3.9). They were prepared using bipolar, unipolar and centripetal strategies respectively, and are all lineal removals. They are relatively small and, consequently, may come from Levallois cores from the site. The fact that there are so few definite Levallois flakes amongst such a relatively large collection of artefacts is notable, as this may imply that such flakes were removed from the site and exploited in the wider landscape. However, this may simply be a reflection of the fact that there are relatively few "classic" Levallois cores from the site.

Non-Levallois Cores

	No. of artefacts	% of total
Migrating platform cores	81	44.8%
Single platform unprepared	73	40.3%
Opposed platform unprepared	2	1.1%
Discoidal	21	11.6%
Fragment	4	2.2%
Total	166	100%

Table 9.3.10 Non-Levallois core forms from Chnine East 1.

Table 9.3.10 illustrates the different non-Levallois approaches to core working identified amongst the assemblage from Chnine East 1. The two most common groups are migrating platform cores (44.8%), resulting from the *ad hoc* exploitation of shifting platforms, and single platform cores (40.3%), the product of flaking from a single, unprepared platform. In addition, discoidal cores are also present (11.6%). These result from alternate/alternating flaking from a single, peripheral platform into the volume of two non-hierarchically related surfaces (Boëda 1995), and may in some cases represent the final expression of centripetal recurrent exploitation of Levallois cores (*cf.* Baumler 1988, Meignen and Bar Yosef 1991, Hovers 1998). As other core forms are only present in small numbers, analysis has focussed on these three main groups.

	Migrating platform cores (n=81)		Single platform cores (n=73)		Discoidal cores (n=21)	
	Maximum dimensions (mm)	Weight (grams)	Maximum dimensions (mm)	Weight (grams)	Maximum dimensions (mm)	Weight (grams)
Mean	54.1	62.3	54.0	80.4	51.0	62.5
Median	55.2	58.0	51.5	66.0	49.6	56.0
Min.	38.1	26.0	36.0	16.0	29.0	25.0
Max.	80.9	153.0	89.2	388.0	87.0	178.0
St.Dev.	8.6	23.6	11.0	58.7	11.5	36.3

Table 9.3.11 Summary statistics for migrating platform, single platform and discoidal cores from Chnine East 1.

The migrating platform, single platform and discoidal cores from Chnine East 1 are very small and relatively light in weight (see table 9.3.11). Futhermore, they are of a similar size to the Levallois and simple prepared cores from the site (see above). The technological attributes of these cores are summarized in tables 9.3.12, 9.3.13 and 9.3.14. This data indicates that the major technological difference between the three approaches to core working lies in the intensity of flaking.

Migrating platform cores; technological observations (n=81)					
Core episodes (n=237)			Flake scars/core (n=81)		
Type A: Single Removal	24	10.1%	1-5	21	25.9%
Type B: Parallel flaking	39	16.5%	6-10	54	66.7%
Type C: Alternate flaking	91	38.4%	>10	6	7.4%
Type D: Unattributed removal	83	35.0%	*Max.*	13	-
			Mean	7.0	-
Core episodes/core			Flake scars/core episode		
Min.	1	-	*Min.*	1	-
Max.	6	-	*Max.*	8	-
Mean	3.1	-	*Mean*	2.4	-
% Cortex (n=81)			Blank form retained? (n=81)		
0	2	2.5%	*Yes*	33	40.7%
1-25%	7	8.6%	*No*	48	59.3%
26-50%	55	67.9%			
51-75%	17	21.0%			
>75%	0	0.0%			

Table 9.3.12 Technological observations for migrating platform cores from Chnine East 1.

Single platform cores; technological observations (n=73)					
Core episodes (n=77)			Flake scars/core (n=73)		
Type A: Single Removal	5	6.5%	1-5	55	75.3%
Type B: Parallel flaking	15	19.5%	6-10	18	24.7%
Type C: Alternate flaking	57	74.0%	>11	0	0.0%
Type D: Unattributed removal	0	0.0%	*Max.*	9	-
			Mean	4.4	-
Core episodes/core			Flake scars/core episode		
Min.	1	-	*Min.*	1	-
Max.	2	-	*Max.*	9	-
Mean	1.0	-	*Mean*	4.2	-
% Cortex (n=73)			Blank form retained? (n=73)		
0	0	0.0%	*Yes*	54	74.0%
1-25%	1	1.4%	*No*	19	26.0%
26-50%	33	45.2%			
51-75%	34	46.6%			
>75%	5	6.8%			

Table 9.3.13 Technological observations for single platform cores from Chnine East 1.

The least intensively worked of the three groups are the single platform cores. They display an average of just 4.4 flake scars per core, usually produced during a single episode of alternate flaking (74.0% of all episodes). Notably, no unattributed removals indicative of the overprinting of previous core episodes were recorded on these cores. Restricted working is also reflected by high cortex retention (46.6% retain cortex on >50% of their surface area), and by the fact that a large number retain the form of the original blank (74.0%). In contrast, the most intensively worked, non-Levallois cores are the discoidal cores. They retain, on average, 9.8 flake scars distributed over an average of 2.6 flaking episodes, each involving around 4 removals (mean = 3.8). Although episodes of alternate flaking predominate (55.5%), such cores frequently possess unattributed removals indicating the overprinting of previous episodes of working. Futhermore, intensive working is reflected in the relatively low cortex retention on the discoidal cores (only one retains >50% cortex), and by the fact that most (85.7%) do not retain the original blank form. This leaves the migrating platform cores which, in terms of reduction intensity, fall between the levels observed for the single platform and discoidal cores. On average they possess 7.0 flake scars per core, produced over an average of 3.1 episodes, consisting of approaching 4 removals (mean = 3.8). Episodes of alternate (38.4%) and parallel (16.5%) flaking, and unattributed removals (35.0%) are all commonly observed. In addition, such cores generally retain relatively high levels of cortex (21.0% possess cortex on >50% of their surface area), and often reflect the original blank form (40.7%).

Discoidal cores; technological observations (n=21)					
Core episodes (n=54)			Flake scars/core (n=21)		
Type A: Single Removal	2	3.7%	1-5	2	9.5%
Type B: Parallel flaking	3	5.6%	6-10	11	52.4%
Type C: Alternate flaking	30	55.5%	11-15	8	38.1%
Type D: Unattributed removal	19	35.2%	>15	0	0.0%
			Max.	15	-
			Mean	9.8	-
Core episodes/core			Flake scars/core episode		
Min.	1	-	*Min.*	1	-
Max.	6	-	*Max.*	13	-
Mean	2.6	-	*Mean*	3.8	-
% Cortex (n=21)			Blank form retained? (n=21)		
0	1	4.8%	*Yes*	3	14.3%
1-25%	5	23.8%	*No*	18	85.7%
26-50%	14	66.6%			
51-75%	1	4.8%			
>75%	0	0.0%			

Table 9.3.14 Technological observations for discoidal cores from Chnine East 1.

The blanks used in the production of the migrating platform, single platform and discoidal cores from Chnine East 1 were fluvially derived, and were almost exclusively nodular (see table 9.3.4). Interestingly, this suggests that, although the non-Levallois core forms reflect differing flaking intensity, they are all on the same, immediately available, blank type. Significantly, however, there is some indication that the size of these blanks varied. This is because, despite the clear differences in the amount of working such cores received, the migrating platform, single platform and discoidal cores share a common volume at the point of discard. Consequently, it would appear that these three approaches to core working were applied to nodules which, although all relatively small, varied in size. The discoidal cores (the most intensively worked) tended to be produced on the largest nodules, single platform cores (the least intensively worked) on the smallest blanks and migrating platform cores (which display intermediate levels of working) being produced on medium-sized cobbles. In addition, the fact that the non-Levallois cores from Chnine East 1 were discarded when they reached a broadly similar size suggests that working was not extended beyond the point at which medium-sized products could be produced. As a result, it seems that the particular technological strategy applied to non-Levallois core working by the Chnine East 1 knappers reflects flake production from different sized (although ultimately, always relatively small) river cobbles. This does not, however, necessarily mean that they represent different parts of a single technological strategy.

Handaxes

No handaxes or handaxe fragments were identified amongst the material studied from Chnine East 1.

Non-Levallois Flakes

	Maximum length (mm)	Maximum breadth (mm)	Maximum thickness (mm)
Mean	46.6	36.4	13.4
Median	45.4	35.4	12.8
Min.	20.3	16.2	3.3
Max.	95.1	75.8	32.4
St.Dev.	10.6	8.9	4.5

Table 9.3.15 Chnine East 1 flakes summary statistics (n=368, fragments excluded).

The non-Levallois flakes analysed from Chnine East 1 tend to be relatively small (table 9.3.15) and could have come from the cores found at the site. Most were produced using a hard hammer (97.4%; table 9.3.16), but two soft hammer flakes were also recorded. This is interesting as no handaxes were identified amongst the material studied. Significantly, many of the non-Levallois flakes studied possess technological features reflective of low intensity flaking, including low numbers of previous flake scars (three or less were recorded on 85.6% of the collection) and uncomplicated scar patterns (51.6% possess uni-directional removals). This suggests that they form part of the same reduction process as that applied to the cores found at the site.

Flakes; technological observations (n=420)					
Portion (n=420)			Dorsal scars (n=368)		
Whole	368	87.6%	0	73	19.8%
Proximal	14	3.3%	1	86	23.4%
Distal	22	5.2%	2	73	19.8%
Mesial	10	2.4%	3	83	22.6%
Siret	6	1.5%	4	32	8.7%
			5	9	2.4%
			>5	8	2.2%
			Obscured	4	1.1%
Dorsal cortex retention (n=368)			Dorsal scar pattern (n=368)		
100%	73	19.8%	*Uni-directional*	190	51.6%
>50%	84	22.8%	*Bi-directional*	53	14.4%
<50%	174	47.3%	*Multi-directional*	47	12.8%
0%	33	9.0%	*Wholly cortical*	73	19.8%
Obscured	4	1.1%	*Obscured*	5	1.4%
Butt type (n=420)			Hammer mode (n=420)		
Plain	163	38.8%	*Hard*	409	97.4%
Dihedral	10	2.4%	*Soft*	2	0.5%
Cortical	128	30.4%	*Indeterminate*	9	2.1%
Natural (but non-cortical)	4	1.0%			
Marginal	21	5.0%	Relict core edge(s) (n=368)		
Mixed	9	2.1%	*Yes*	144	39.1%
Obscured	60	14.3%	*No*	224	60.9%
Missing	25	6.0%			

Table 9.3.16 Technological observations for non-Levallois flakes from Chnine East 1.

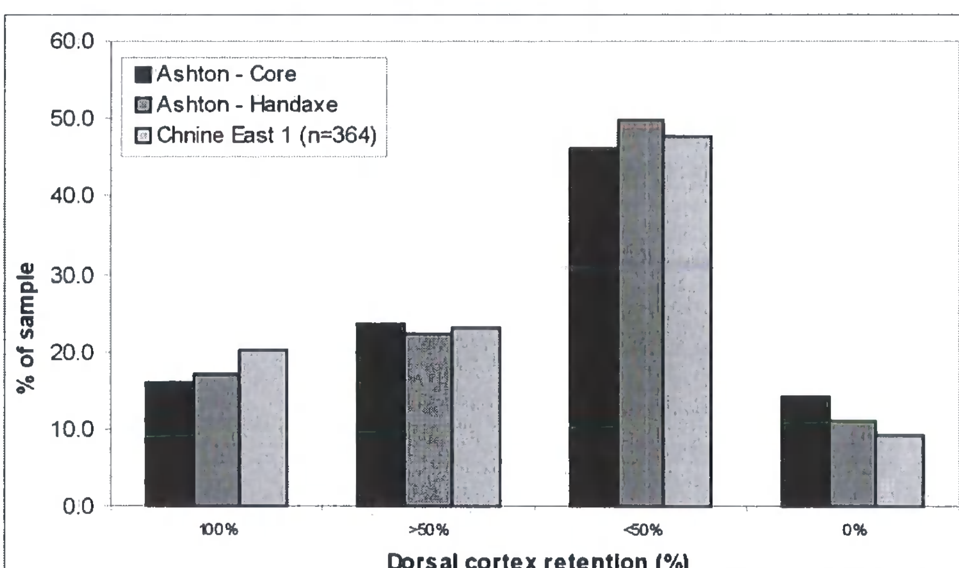

Figure 9.3.7 Comparison of percentage dorsal cortex rentention on non-Levallois flakes from Chnine East 1 and experimental data generated by Ashton (1998b) for core reduction.

Comparison between the distribution of cortex retention on the non-Levallois flakes from Chnine East 1 with Ashton's (1998b) experimental data for cortex retention demonstrates a good correlation between the archaeological and experimental datasets (figure 9.3.7).

Complete knapping sequences are therefore likely to be present amongst the debitage from the site, which supports the conclusion that extensive core working was undertaken here. Futhermore, on-site reduction of blanks is suggested by the fact that the vast majority of non-Levallois flakes retain cortex indicative of the exploitation of derived river cobbles, which were immediately available (see table 9.3.4). However, it is interesting that the collection also includes seven hard hammer flakes that retain fresh, chalky cortex indicating that they are the result of flaking chert/flint nodules obtained from bedrock. As the nearest known source of such material is located ~50 km away (see above), these flakes (or the nodules from which they were detached) must have been brought into the site from elsewhere.

Retouched Tools

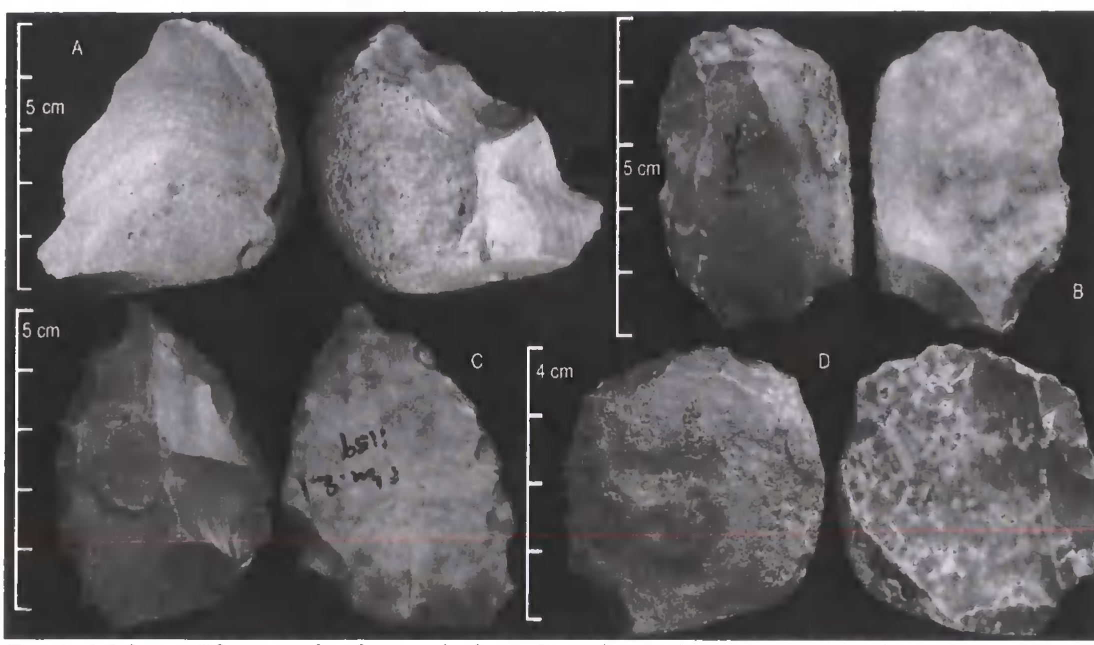

Figure 9.3.8 Photograph of retouched artefacts from Chnine East 1: a=denticulate on non-Levallois flake, b=non-Levallois flake with bificial retouch on distal, c=probable Levallois point retouched along lateral edge and d =Levallois core reworked to form a scraper.

Four retouched artefacts were identified amongst the material studied from Chnine East 1 (see figure 9.3.8). Three are flake tools and consist of a non-Levallois flake formed into a denticulate (a), a non-Levallois flake that has been steeply retouched along its distal margin and bifacially retouched at the proximal end (possibly to thin the butt to facilitate hafting) (b) and a probable Levallois point that has been retouched along one lateral edge (c). The fourth retouched artefact is a simple prepared core which, following the detachment of a final preferential removal, was reworked to form a scraper by modifying the striking platform along one edge of the core (d).

Technology and Hominin Behaviour

The vast majority of the artefacts studied from Chnine East 1 come from the surface of pre-existing terrace gravels. They therefore constitute a time-averaged palimpsest, which reflects ongoing technological practices at the site over an unknown period. The assemblage is dominated by two key technological strategies: Levallois/simple prepared core working, and a more *ad hoc* approach to flaking. However, there is also a hint of handaxe working, albeit in the form of just two soft hammer thinning flakes. Whilst all the cores from the site seem to reflect the selection and working of immediately available nodules, the flake assemblage does suggest that some artefacts were transported into the area from elsewhere.

The Levallois and simple prepared cores from the site share many similarities with those from the nearby site of Rhayat 2 (see section 9.2) in that they reflect the flaking of immediately available, though small, river pebbles, which only allowed for a single phase of productive flaking. Futhermore, as at Rhayat 2, simple prepared cores are over-represented in comparison with Levallois cores, a fact which can again be accounted for by the size of the available blanks. Repeated re-preparation and exploitation of flaking surfaces of this size was not often possible.

The large non-Levallois core assemblage from Chnine East 1 is particularly interesting as differences in reduction intensity appear to relate directly to selected blank size. Three main approaches to core reduction were taken: single platform, migrating platform and discoidal flaking. All three types are on immediately available blanks; however, those used to produce the migrating platform cores were larger than those with only a single platform, whilst the discoidally worked cores were produced on nodules which were slightly bigger again. This variation is also reflected in how intensively the cores were worked; discoidal cores are most intensively worked, whilst single platform cores appear to be worked the least. Migrating platform cores fall somewhere in the middle. It therefore seems that the final form of these cores results from how intensively they could be worked - a direct reflection of initial blank volume.

In conclusion, Chnine East 1 represents a place in the landscape at which hominins exploited immediately available raw material (predominantly through core working). The size and volume of the nodules available exerted some influence upon the technological strategies used; few Levallois cores are present, the exploitation of such small nodules most commonly being limited to a single, unprepared phase, whilst the non-Levallois cores were worked with varying intensity as their volume allowed. Regardless of the strategy adopted, there does seem to be an emphasis upon the production of the largest flake blanks possible from these cores – presumably as a source of transformable cutting edges. The fact that at least some such products were carried around is attested to by the non-local flakes present at the site. This pattern appears to contrast with sites of a similar techno-typological composition in the Orontes Valley (see chapter six), where the cores themselves seem to be transported more frequently.

9.4 Chnine West 1

Location & History of Investigation

On the opposite (west) bank of the River Balikh from Chnine East 1 a second sizeable collection of typo-technologically Middle Palaeolithic artefacts (n=392) was obtained during the course of the 1978 RCP 438 survey (see chapter seven, section 7.2), from the surface of terrace gravels (Copeland 2004, 30, Hours 1979, 13). The site, referred to as Chnine West 1, is located south of the bridge at Chnine (see figure 9.2.1).

Geological Background & Preferred Dating

The Pleistocene gravels found at Chnine West 1 are thought to have been deposited during the same period as those located on the opposite bank of the Balikh at Chnine East 1 (see section 9.3). Consequently the Chnine West deposits are ascribed to the Euphrates, as they are located in an old meander loop of that river, which is thought to have been active when they were deposited (Demir *et al.* 2007b, 19; see figure 9.3.1). They have been correlated with the Qf III Euphrates formation (Copeland 2004, 30) which, although probably of considerable age, lacks chronological constraints in this area (see section 9.3). In any case, as all the artefacts studied from Chnine West 1 were recovered from the surface of these gravels and are generally unabraded (see below), most were probably discarded on the gravel surface after aggradation ceased.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	No. of artefacts	% of total
Levallois cores	17	4.7%
Simple prepared cores	4	1.1%
Non-Levallois cores	86	23.6%
Definite Levallois Flakes	2	0.5%
Probable Levallois flakes	2	0.5%
Possible Levallois flakes	5	1.4%
Handaxes	2	0.5%
Non-Levallois flakes	246	67.4%
Flake tools	1	0.3%
Total	365	100%

Table 9.4.1 Material analysed from Chnine West 1.

A total of 365 artefacts from Chnine West 1 have been analysed (see table 9.4.1). All are housed in the collections of the National Museum in Damascus.

Taphonomy of lithic assemblage

Cores from Chnine West 1 (n=107)					
Unabraded	95	88.8%	*No edge damage*	1	0.9%
Slightly abraded	10	9.3%	*Slight edge damage*	54	50.5%
Moderately abraded	2	1.9%	*Moderate edge damage*	45	42.1%
Heavily abraded	0	0.0%	*Heavy edge damage*	7	6.5%
Unstained	51	47.7%	*Unpatinated*	3	2.8%
Lightly stained	43	40.2%	*Lightly patinated*	15	14.0%
Moderately stained	10	9.3%	*Moderately patinated*	65	60.7%
Heavily stained	3	2.8%	*Heavily patinated*	24	22.4%
Unscratched	98	91.6%			
Lightly scratched	8	7.5%			
Moderately scratched	0	0.0%			
Heavily scratched	1	0.9%			

Table 9.4.2 Condition of cores from Chnine West 1.

	Abrasion	Edge Damage	Staining	Patination	Scratching
Chn O 460	None	Slight	None	Moderate	None
Chn O 473	None	Moderate	Moderate	Slight	None

Table 9.4.3 Condition of handaxes from Chnine West 1.

Flakes from Chnine West 1 (n=256)					
Unabraded	245	95.7%	*No edge damage*	2	0.8%
Slightly abraded	11	4.3%	*Slight edge damage*	44	17.2%
Moderately abraded	0	0.0%	*Moderate edge damage*	146	57.0%
Heavily abraded	0	0.0%	*Heavy edge damage*	64	25.0%
Unstained	109	42.6%	*Unpatinated*	1	0.4%
Lightly stained	126	49.2%	*Lightly patinated*	56	21.9%
Moderately stained	20	7.8%	*Moderately patinated*	139	54.3%
Heavily stained	1	0.4%	*Heavily patinated*	60	23.4%
Unscratched	256	100%			
Lightly scratched	0	0.0%			
Moderately scratched	0	0.0%			
Heavily scratched	0	0.0%			

Table 9.4.4 Condition of flakes from Chnine West 1.

Few of the artefacts studied from Chnine West 1 display evidence of fluvial reworking, most being fresh, or only slightly abraded (see tables 9.4.2, 9.4.3 and 9.4.4). This suggests most of the material studied came from the surface of the gravels found at the site. The potential exceptions are the two cores which are moderately abraded, and could derive from (and be broadly contemporary with) the fluvial deposits. These have been excluded from further analysis.

Notably, whilst not having been subject to fluvial transport, a significant number of artefacts (72.1%) possess at least moderate levels of edge damage. This is potentially indicative of trampling, and suggests that the bulk of the material from the site has lain on the surface for a period of time. This is further hinted at by the fact that some of the artefacts (2.5%) display evidence of exposure to sub-aerial processes in the form of surface scratching; the fact that most (79.2%) are moderately or heavily patinated may also relate to this.

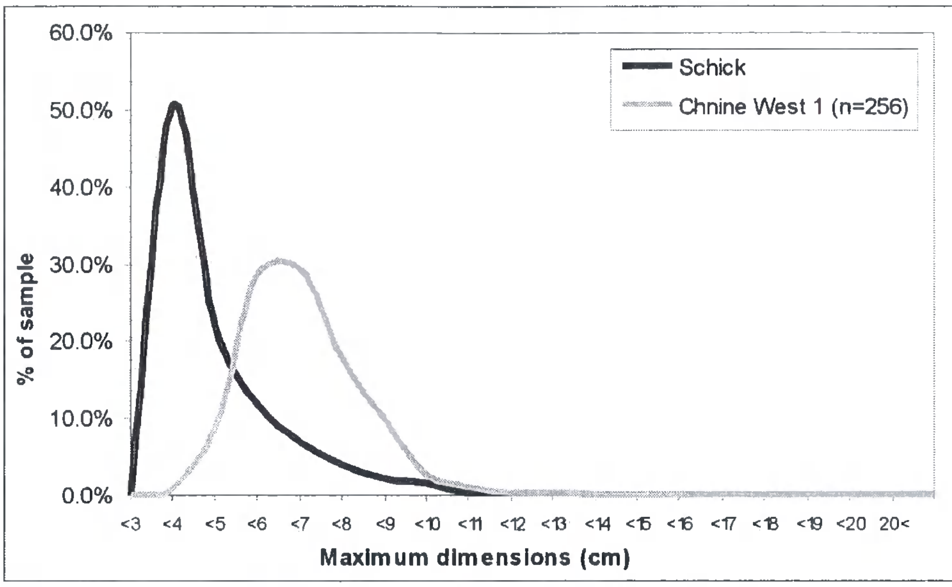

Figure 9.4.1 Comparison of maximum dimension of fresh/slightly abraded debitage larger than 2 cm recovered from Chnine West 1 and experimental data generated by Schick (1986).

Comparison of the size distribution of flakes studied with that produced by Schick (1986) during experimental non-prepared core reduction (figure 9.4.1), however, indicates that flakes under 5 cm in maximum dimension are notably under-represented in the archaeological assemblage. This may relate to the fact that the material was collected from a landsurface, and not through systematic excavation.

Technology of lithic assemblage

Raw Material

Most of the artefacts studied from Chnine West 1 are produced on coarse-grained chert/flint, the only exceptions being three migrating platform cores on quartz nodules. The vast majority of the cores and handaxes examined are on river-worn nodules, which were immediately available from the gravels at the site (see table 9.4.4). Two interesting exceptions to this are a pair of cores (one migrating platform and one unprepared single platform core) that retain fresh cortex. As no primary source of chert/flint exists in the area surrounding the site (the nearest source is in fact located ~50 km to the north-west near Tellik), these are likely to have been brought in following exploitation in the wider landscape.

	Levallois cores (n=17)	Simple prepared cores (n =4)	Non-Levallois cores (n=86)	Handaxes (n=2)	Definite Levallois flakes (n=2)	Non-Levallois flakes (n=247)
Raw material						
Fresh	0.0%	0.0%	2.3%	0.0%	0.0%	0.8%
Derived	94.1%	100%	94.2%	50.0%	0.0%	66.8%
Indeterminate	5.9%	0.0%	3.5%	50.0%	100%	32.4%
Blank form						
Nodule	0.0%	50.0%	37.2%	50.0%	-	-
Shattered Nodule	0.0%	0.0%	8.1%	0.0%	-	-
Flake	0.0%	0.0%	3.5%	0.0%	-	-
Thermal flake	0.0%	0.0%	0.0%	0.0%	-	-
Indeterminate	100%	50.0%	51.2%	50.0%	-	-

Table 9.4.5 Raw material and inferred blank form for artefacts studied from Chnine West 1.

Levallois Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	59.6	56.2	23.5	80.5	0.96	0.42
Median	59.8	55.2	22.8	67.0	0.96	0.43
Min.	43.5	45.7	14.8	42.0	0.72	0.31
Max.	80.8	68.1	33.1	179.0	1.25	0.54
St.Dev.	9.6	6.6	5.3	33.4	0.16	0.08

Table 9.4.6 Chnine West 1 Levallois cores summary statistics (n=17).

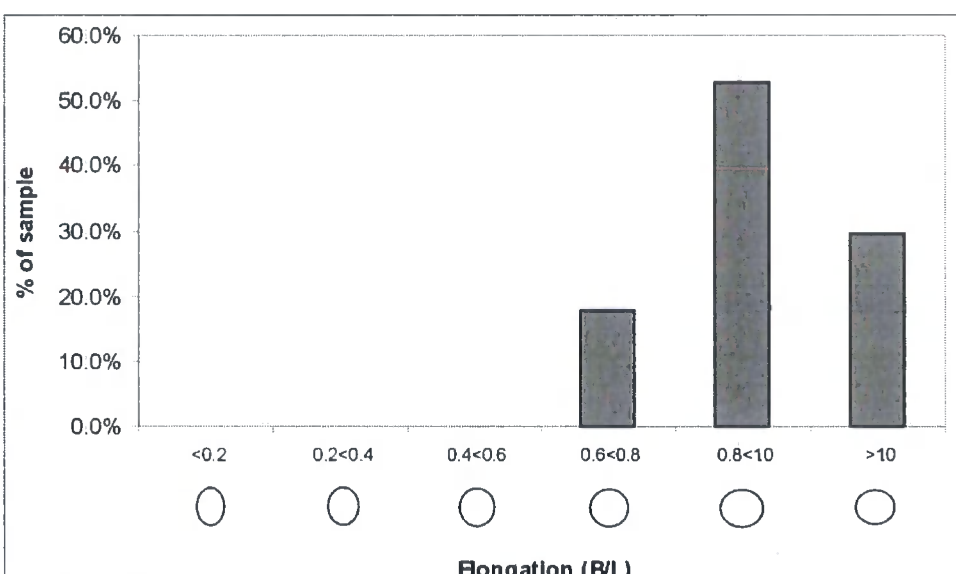

Figure 9.4.2 Elongation of Levallois cores from Chnine West 1 (n=17).

Seventeen Levallois cores were identified amongst the artefacts studied from Chnine West 1. Morphologically, they resemble those from Chnine East 1 (see section 9.3) in that they tend to be very small (see table 9.4.6), round in planform (see figure 9.4.2) and relatively flat (see figure 9.4.3). Despite many being extensively worked, a significant number clearly retain enough volume to allow further reduction. However, given their small size, it is perhaps significant that any attempt at further working of these cores by reconfiguring their flaking surfaces would have inevitably resulted in the detachment of diminutive Levallois products. As this was not undertaken, it seems that moderately-sized Levallois flakes were desired by the Chnine West 1 knappers.

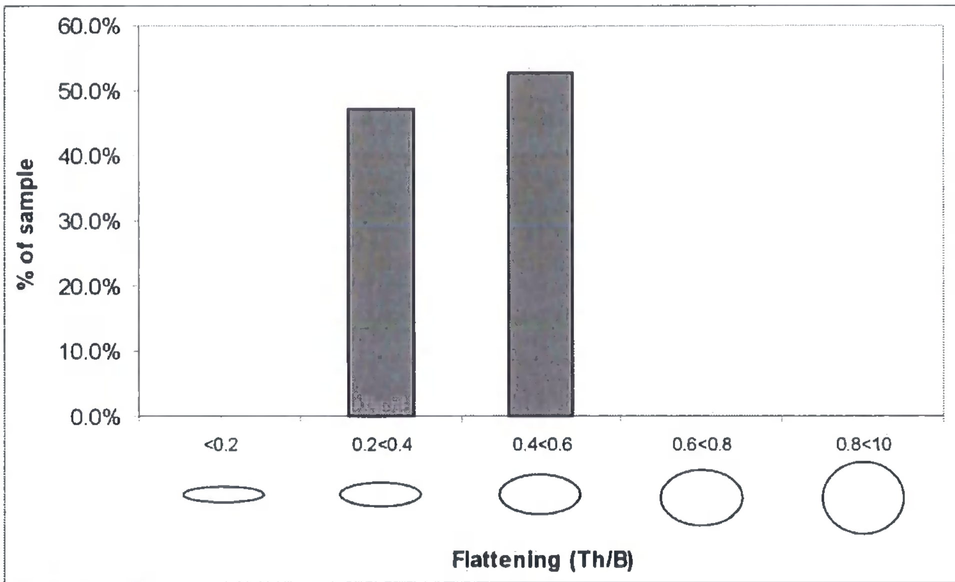

Figure 9.4.3 *Flattening of Levallois cores from Chnine West 1(n=17).*

Many of the Levallois cores from Chnine West 1 were near-exhausted (see table 9.4.7.); more than a third (35.2%) are prepared/re-prepared, but unexploited, and nearly half (47.1%) are prepared using centripetal removals. It has been suggested that this preparatory strategy is often adopted late on in Levallois reduction sequences (*cf.* Baumler 1988, Meignen and Bar Yosef 1991, Hovers 1998). Notably, all the Levallois cores from the site are made on river pebbles which were immediately available (see table 9.4.5), suggesting many Levallois cores underwent all reduction stages - from raw material procurement to discard - within the area. It is also possible, however, that some of the cores could have been taken away from the site and exploited elsewhere; the high proportion of exhausted cores may have been carried through the landscape, and only finally discarded once hominins returned to an available source of raw material.

As the Levallois cores possess relatively low scar counts and high levels of cortex rentention on their striking platforms (no core retains more than 10 removals, whilst 58.8% retain cortex on >50% of this surface), it seems that they were produced on relatively small river cobbles. Interestingly, however, there is some indication that the blanks employed tended to be larger than those worked on the opposite bank of the River Balikh at Chnine East 1. This is suggested by the fact that Levallois cores from Chnine West 1 tend to display higher scars counts and lower levels of cortex retention on their striking platform surface (see tables 9.3.6 and 9.4.7) than those from Chnine East 1. More significantly, three cores from Chnine West

1 retain remnant distals on their striking platform; no such examples are apparent from the east bank site. Given that the blanks used at Chnine East 1 were frequently too small to allow the preparation of Levallois flaking surfaces (see section 9.3), this apparent difference in blank size may account for the fact that Levallois cores are more common amongst the assemblage from Chnine West 1; the available nodules possessed greater reductive potential. However, it is important to note that Levallois flaking at the two sites appears to have followed a broadly analogous strategy, characterized by the removal of a limited number of preferential flakes from cores on small, immediately available river pebbles.

Levallois cores; technological observations (n=17)							
Preparation method (n=17)			Exploitation method (n=17)				
Unipolar	2	11.8%	*Unexploited*			1	5.9%
Bipolar	4	23.4%	*Lineal*			8	47.1%
Convergent unipolar	2	11.8%	*Unipolar recurrent*			2	11.8%
Centripetal	8	47.1%	*Re-prepared but unexploited*			5	29.3%
Unipolar from distal	1	5.9%	*Failed*			1	5.9%
Preparatory scars on flaking surface (n=17)			Preparatory scars on striking platform (n=17)				
1-5	6	35.3%	1-5			9	52.9%
6-10	11	64.7%	6-10			8	47.1%
>10	0	0.0%	>10			0	0.0%
Position of cortex on striking platform (n=17)			Percentage cortex on striking surface (n=17)				
None	0	0.0%	0			0	0.0%
All over	6	35.3%	1-25%			1	5.9%
Central and one edge	2	11.8%	26-50%			6	35.3%
Central and more than one edge	9	52.9%	51-75%			5	29.4%
			>75%			5	29.4%
Levallois products from flaking surface (n=17)			Types of Levallois products from core (n=xxx)				
0	7	41.1%	*Unexploited*			6	35.3%
1	8	47.1%	*Flake*			8	47.1%
2	1	5.9%	*Point*			2	11.8%
3	1	5.9%	*Failed removal*			1	5.9%
Earlier flaking surface (n=17)			Dimension of final Levallois products (n=12)				
Yes	1	5.9%	*Min. Length*	25.2	*Min. Breadth*		25.8
No	16	94.1%	*Max. Length*	70.5	*Max. Breadth*		52.4
			Mean Length	47.6	*Mean Breadth*		39.6
Remnant distals on striking platform (n=17)							
Yes	3	17.6%					
No	14	82.4%					

Table 9.4.7 Technological observations for Levallois cores from Chnine West 1.

Simple Prepared Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Chn O 1 330	47.4	44.3	21.5	52	0.93	0.49
Chn O 1 371	49.7	58.3	17.5	68	1.17	0.30
Chn O 1 381	59.7	43.1	27.7	78	0.72	0.64
Chn O 1 495	64.2	64.1	29.2	117	1.00	0.46

Table 9.4.8 Chnine West 1 simple prepared core summary statistics.

Only four simple prepared cores were identified amongst the artefacts studied from Chnine West 1. They are small (some extremely so), round in planform and relatively flat (see table 9.4.8). In spite of this, all but one could arguably have been further reduced. However, as the natural convexities of these cores have been exhausted, their surfaces would have required reconfiguration (thus making them conform to the volumetric definition of a Levallois core) prior to further exploitation. Given their generally small size, this process would have resulted in the production of diminutive products, and was therefore not attempted. Consequently, the simple prepared cores, like the fully Levallois examples, seem to reflect an emphasis upon production of moderately sized flakes.

Simple prepares cores; technological observations (n=4)							
Exploitation method (n=4)			Preparatory scars on striking platform (n=4)				
Unipolar recurrent	4	100%	1-5			4	100%
			>5			0	0.0%
Percentage cortex on striking surface (n=4)			Position of cortex on striking platform (n=4)				
0	0	0.0%	*None*			0	0.0%
1-25%	0	0.0%	*All over*			1	25.0%
26-50%	2	50.0%	*Central and more than one edge*			3	75.0%
51-75%	1	25.0%					
>75%	1	25.0%	Dimension of final products (n=5)				
			Min. Length	33.0	*Min. Breadth*		26.0
Products from final flaking surface (n=4)			*Max. Length*	55.0	*Max. Breadth*		31.7
0	0	0.0%	*Mean Length*	44.3	*Mean Breadth*		29.2
1	1	25.0%					
2	1	25.0%	Remnant distals on striking platform (n=4)				
3	2	50.0%	*Yes*			0	0%
			No			4	100%

Table 9.4.9 Technological observations for simple prepared cores from Chnine West 1.

The technological attributes of the four simple prepared cores from Chnine West 1 (table 9.4.9) suggest that the nodules on which they were all produced were not much larger than the artefacts themselves when discarded. This is illustrated by the low number of preparatory scars retained (all possess less than five scars) and the fact that two retain the form of the original blank. As a result, these cores seem to reflect the exploitation of the natural convexities of small river pebbles (all are on derived and, therefore, immediately available blanks; see table 9.4.5) through limited flaking of a surface. However, perhaps the most interesting aspect of the simple prepared cores is the fact that so few were encountered compared to the Levallois cores. This is particularly significant as the opposite is the case at Chnine East 1. Arguably, this observation supports the assertion that larger blanks were available at Chnine West 1; these were sizable enough to allow re-preparation of flaking surfaces and subsequent exploitation. In contrast, the nodules available at Chnine East 1 only allowed a single phase of exploitation, utilising the natural convexities of a nodule.

Levallois Products

	Type	Portion	Butt	Prep. scars	Prep. method	Exploit. method	Length (mm)	Breadth (mm)	Thick. (mm)	Elong. (B/L)
1	Point	Whole	Plain	3	Converg. unipolar	Single removal	54.8	36.5	11.6	0.67
2	Point	Whole	Chap. de Gend.	4	Bipolar	Single removal	54.1	36.1	8.9	0.67

Table 9.4.10 Summary statistics and technological observations for definite Levallois products from Chnine West 1.

Only two definite Levallois products were identified amongst the artefacts from Chnine West 1 (see table 9.4.10). Both are points. One is the product of convergent unipolar preparation and has a plain butt, whilst the other is result of bipolar preparation and displays a well prepared *chapeau de gendarme* butt. Both are lineal removals that do not retain any evidence of previous Levallois flake scars and would clearly have prevented the removal of a subsequent product. They are relatively small and, as such, could potentially have been produced from Levallois cores from the site. The fact that there are so few definite Levallois flakes amongst the collection is notable, particularly in light of the relatively high number of Levallois cores, and could suggest that such products were carried through, and used, in the wider landscape. However, collection bias may also be a factor.

Non-Levallois Cores

The non-Levallois cores from Chnine West 1 are broadly similar in size to the Levallois and simple prepared cores from the site, being relatively small and light (see table 9.4.11). Their technological attributes are summarized in table 9.4.12. Most (76.7%) can be described as migrating platform cores resulting from the *ad hoc* exploitation of particular platforms as they became available throughout reduction. Generally, working of these cores involved a limited number of episodes (average = 1.8) of alternate flaking (59.4% of all episodes).

	Maximum dimensions (mm)	Weight (grams)
Mean	66.9	113.1
Median	62.7	91.0
Min.	42.7	23.0
Max.	112.5	390.0
St.Dev.	14.0	71.8

Table 9.4.11 Chnine West 1 non-Levallois cores summary statistics (n=78, fragments excluded).

The cores studied tend to retain large amounts of cortex (80.8% retain cortex on >25% of their surface area, whilst 32.1% retain cortex on >50%) and the form of the original blank (46.2%). This indicates that the nodules on which they are produced were probably not much larger than the cores themselves at the point of discard and were therefore relatively small. However, as in the case of the Levallois and simple prepared cores from Chnine West 1, there is some suggestion that the blanks used to produce the non-Levallois cores were often slightly larger than those exploited on the opposite bank of the Balikh at Chnine East 1. This is implied by the fact that single platform cores, found in abundance at Chnine East 1 and seemingly associated with the reduction of the smallest available nodules (see section 9.3), were only rarely encountered (n=8) amongst the material analysed from Chnine West 1.

Cores; technological observations (n=86)					
Overall core reduction (n=86)			Core episodes (n=143)		
Migrating platform cores	66	76.7%	*Type A: Single Removal*	20	14.0%
Single platform unprepared	8	9.3%	*Type B: Parallel flaking*	21	14.7%
Opposed platform unprepared	1	1.2%	*Type C: Alternate flaking*	85	59.4%
Discoidal	3	3.5%	*Type D: Unattributed removal*	17	11.95
Fragment	8	9.3%			
Flake scars/core (n=78)			Core episodes/core		
1-5	32	41.0%	*Min.*	1	-
6-10	28	36.0%	*Max.*	6	-
11-15	15	19.2%	*Mean*	1.8	-
>15	3	3.8%			
Max	19	-	Flake scars/core episode		
Mean	7.3	-	*Min.*	1	-
			Max.	16	-
% Cortex (n=78)			*Mean*	4.0	-
0	1	1.3%			
1-25%	14	17.9%	Blank form retained? (n=78)		
26-50%	38	48.7%	*Yes*	36	46.2%
51-75%	23	29.5%	*No*	42	53.8%
>75%	2	2.6%			

Table 9.4.12 Technological observations for non-Levallois cores from Chnine West 1.

Most non-Levallois cores from Chnine West 1 are produced on water-worn nodules (see table 9.4.5). Consequently, it seems that such cores are largely the product of a limited reduction strategy applied to relatively small, and immediately available, river pebbles. However, it is interesting to note that two examples produced on nodules with fresh chalky cortex were also identified. As these are on material obtained from bedrock chert/flint, the nearest source of which is located ~50 km from Chnine (see above), it seems that these cores were brought into the site following exploitation in the wider landscape.

Handaxes

	Length (mm)	**Breadth (mm)**	**Thickness (mm)**	**Refinement (Th/B)**
Chn O 1 460	57.4	51.5	34.5	0.67

Table 9.4.13 Chnine West 1 complete handaxe summary statistics.

Two handaxes were encountered amongst the material studied from Chnine West 1. Only one is complete, the other consisting of a tip fragment. Both pieces are in similar physical condition to the rest of the assemblage, and neither shows signs of fluvial transport. The complete handaxe is diminutive, displays moderate levels of refinement and is round in planform (see table 9.4.13 and figure 9.4.4). It retains small amounts of cortex and is the product of hard hammer flaking of a small river cobble.

Figure 9.4.4 Photograph of complete handaxe from Chnine West 1.

Non-Levallois Flakes

	Maximum length (mm)	**Maximum breadth (mm)**	**Maximum thickness (mm)**
Mean	54.6	41.9	16.5
Median	52.8	40.3	15.9
Min	27.5	17.9	6.1
Max	111.3	83.9	38.9
St.Dev.	14.5	11.4	5.5

Table 9.4.14 Chnine West 1 flakes summary statistics (n=210, fragments excluded).

The non-Levallois flakes analysed from Chnine West 1 are generally small (table 9.4.14) and, as a consequence, could have been detached from the cores found at the site. Significantly, this association is supported by their technological attributes (table 9.4.15) which suggest that, like the cores, they were produced through low intensity reduction. Features indicative of this limited approach to working include the fact that they possess few previous flake scars (three or less were recorded on 80.0% of the collection) and that they frequently possess uncomplicated scar patterns (42.9% possess uni-directional removals).

Flakes; technological observations (n=247)					
Portion (n=247)			Dorsal scars (n=210)		
Whole	210	85.0%	0	29	13.8%
Proximal	4	1.6%	1	41	19.5%
Distal	22	9.0%	2	52	24.8%
Mesial	4	1.6%	3	46	21.9%
Siret	7	2.8%	4	23	11.0%
			5	8	3.8%
			>5	11	5.2%
Dorsal cortex retention (n=210)			Dorsal scar pattern (n=210)		
100%	29	13.8%	*Uni-directional*	90	42.9%
>50%	27	12.9%	*Bi-directional*	4	1.9%
<50%	101	48.1%	*Multi-directional*	87	41.4%
0%	53	25.2%	*Wholly cortical*	29	13.8%
Butt type (n=247)			Hammer mode (n=247)		
Plain	81	32.8%	*Hard*	246	99.6%
Dihedral	15	6.1%	*Soft*	0	0.0%
Cortical	47	19.0%	*Indeterminate*	1	0.4%
Natural (but non-cortical)	9	3.6%			
Marginal	5	2.0%	Relict core edge(s) (n=21)		
Mixed	3	1.2%	*Yes*	64	30.5%
Obscured	65	26.3%	*No*	146	69.5%
Missing	22	9.0%			

Table 9.4.15 Technological observations for non-Levallois flakes from Chnine West 1.

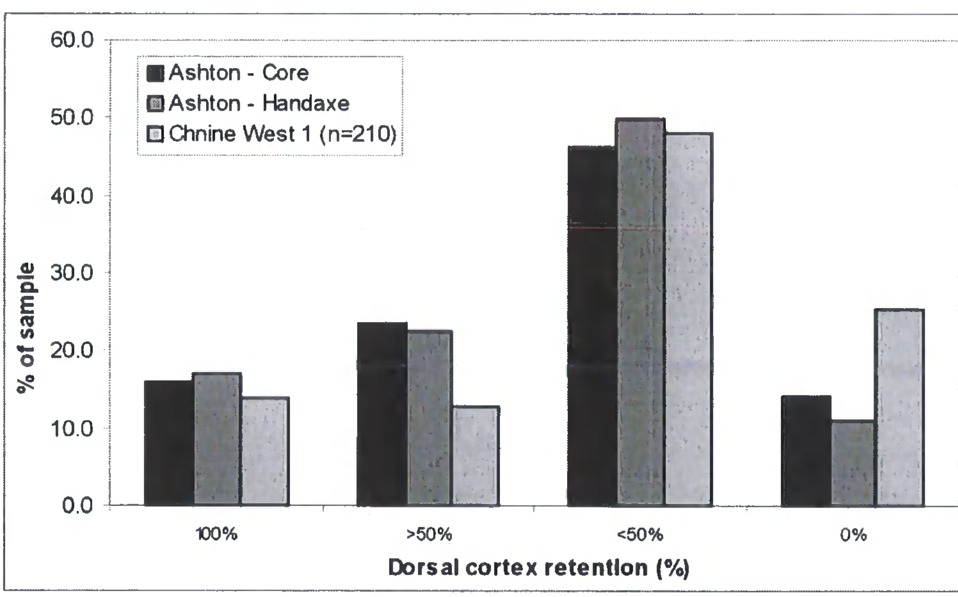

Figure 9.4.5 Comparison of percentage dorsal cortex rentention on non-Levallois flakes from Chnine West 1 and experimental data generated by Ashton (1998b) for core reduction.

On-site reduction at Chnine West 1 is suggested by the fact that the vast majority of the non-Levallois flakes retain cortex indicative of the exploitation of river cobbles, which were immediately available at the site (see table 9.4.5). However, comparison between cortex retention on flakes with Ashton's (1998b) experimental data indicates that non-cortical flakes are significantly over-represented in the collection (see figure 9.4.5). This could indicate that some nodules were brought into the site having been decorticated elsewhere.

However, given the nature of recovery of the collection (grab sample from a surface) this pattern could simply be a product of collection bias.

Retouched Tools

Only one retouched tool was identified amongst the collection studied from Chnine West 1; a flaked flake.

Technology and Hominin Behaviour

The artefacts studied from Chnine West 1 share many similarities with those found on the opposite bank of the Balikh at Chnine East 1 (see section 9.3), including the fact that most come from the surface of pre-existing fluvial gravels which acted as a source of raw material. Futhermore, the main technological strategies employed are similarly dominated by Levallois/simple prepared core working and a more *ad hoc* approach to flaking. Once again, however, handaxes also seem to have been used.

In addition to these general technological similarities, approaches to core working at Chnine West 1 are broadly analogous to Chnine East 1 (and for that matter at Rhayat 2; see section 9.2), being characterized by the limited flaking of small, immediately available nodules. However, a subtle difference is also apparent; despite being small, the blanks available to the Chnine West 1 knappers appear to have been slightly larger. They therefore more frequently allowed for the re-preparation and exploitation of Levallois core surfaces, without producing overly miniaturized products. Consequently, Levallois cores (which were relatively rare amongst the material from Chnine East 1 and Rhayat 2) are comparatively abundant at Chnine West 1, whilst simple prepared cores are, conversely, more rare. It is therefore perhaps significant that so few Levallois products were encountered amongst the material from Chnine West 1, as this suggests that these may have been taken away for use elsewhere.

In consequence, the technological patterns and evidence for hominin behaviour evident at Chnine West 1 are broadly analogous with those observed at Chnine East 1 and Rhayat 2. However, the fact that the available blanks were slightly larger at Chnine West 1 more frequently allowed for some deliberate preparation - and re-preparation - of Levallois flaking surfaces. This group of sites therefore reflect the variable application of a common repertoire of flake production techniques, geared towards maximising the size of the blanks produced as far as possible. Such raw material exposures seem to have acted as magnet locations, the available material consequently exerting some influence upon how core working techniques were enacted at each specific locale, resulting in the broadly similar (but subtly different) artefact assemblages discarded at them.

9.5 Qara Yaaqoub

Location & History of Investigation

During the 1979 RCP 438 survey of the upper reaches of the Syrian Euphrates and Sajour (see chapter seven, section 7.2), 465 artefacts, including typo-technologically Middle Palaeolithic material, were recovered from a gravel surface in several places around Qara Yaaqoub village (Copeland 2004, 30; see figure 9.5.1). This settlement is located on the north bank of the Sajour ~19 km west of its confluence with the Euphrates (see figure 9.1.1). As all the typo-technologically Middle Palaeolithic artefact collections discussed thus far in this chapter were recovered from sites located along the middle course of the Syrian Euphrates (sections 9.2, 9.3 and 9.4), the Qara Yaaqoub material provides an insight into similar technological practices carried out at a location significantly further (~150 km) upstream.

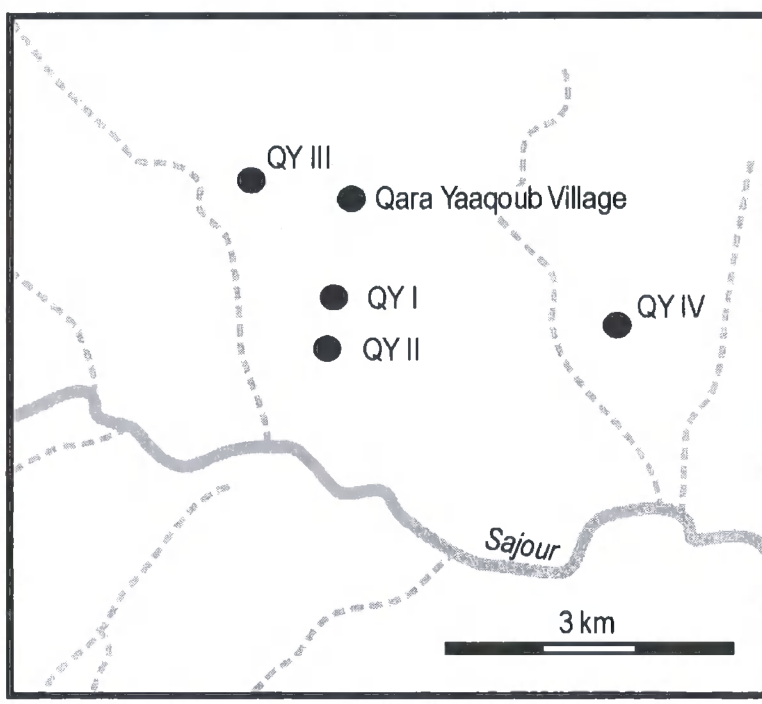

Figure 9.5.1 Location map illustrating position of Middle Palaeolithic findspots situated in the vicinity of Qara Yaaqoub.

Geological Background & Preferred Dating

The fluvial deposits located in the vicinity of Qara Yaaqoub village are situated on a plateau which overlooks the valley of the River Sajour (Sanlaville 2004, 117). They form part of a sizeable spread of coarse gravel which is made up largely of chert/flint and limestone nodules (see figure 9.5.2); the fine grained material has been removed by erosion (Besançon and Sanlaville 1981, 16). Basalt clasts, probably originating from the Taurus Mountains, are also encountered within the deposits (Besançon 1981, 45).

Figure 9.5.2 Photograph illustrating gravels found on the plateau overlooking Sajour Valley in the vicinity of Qara Yaaqoub village (from Sanlaville 2004).

It is clear from their location on a plateau overlooking a river valley that the Qara Yaaqoub gravels are of considerable antiquity. They are thought to predate the Qf III deposits found in the area by a considerable margin (Sanlaville 2004, 177) and, therefore, were probably emplaced during the Early Pleistocene at the latest. Indeed, a sample of basalt overlying plateau gravels located at Sireen on the upper coarse of the Syrian Euphrates (see figure 9.5.1) has been recently yield an Ar-Ar age estimate of ~9 mya, suggesting it was deposited during the late Miocene (Demir *et al.* 2007a). Consequently, the artefacts recovered from the surface of the Qara Yaaqoub gravels almost certainly all post-date their deposition by a considerable period of time, a contention which is supported by the fact that no artefacts have been recovered *in-situ* from these deposits.

Analysis of the Assemblage

Treatment and selection of lithic assemblage

	No. of artefacts	% of total
Levallois cores	37	33.0%
Simple prepared cores	1	0.9%
Definite Levallois Flakes	3	2.7%
Handaxes	71	63.4%
Total	112	100%

Table 9.5.1 Material analysed from Qara Yaaqoub.

As it is clear from published information that the artefact collections recovered from the surface of the Qara Yaaqoub gravels contain typo-technologically Neolithic, as well as

Palaeolithic, material (e.g. Copeland 2004, 30), the decision was taken to analyse only the Levallois cores, Levallois products, handaxes and handaxe thinning flakes from the site. This is because these could confidently be said to be Palaeolithic in date (for further discussion on this point see chapter 3). Furthermore, as the artefact markings did not allow for the material to be assigned to a particular collection point, they are considered here as a single assemblage. In all a total of 112 artefacts, all housed in the collections of the National Museum in Damascus, were analysed.

Taphonomy of lithic assemblage

Cores from Qara Yaaqoub (n=38)					
Unabraded	37	97.4%	*No edge damage*	0	0.0%
Slightly abraded	1	2.6%	*Slight edge damage*	26	68.4%
Moderately abraded	0	0.0%	*Moderate edge damage*	11	29.0%
Heavily abraded	0	0.0%	*Heavy edge damage*	1	2.6%
Unstained	11	28.9%	*Unpatinated*	0	0.0%
Lightly stained	18	47.4%	*Lightly patinated*	7	18.4%
Moderately stained	8	21.1%	*Moderately patinated*	28	73.7%
Heavily stained	1	2.6%	*Heavily patinated*	3	7.9%
Unscratched	37	97.4%			
Lightly scratched	0	0.0%			
Moderately scratched	0	0.05			
Heavily scratched	1	2.6%			

Table 9.5.2 Condition of cores from Qara Yaaqoub.

Handaxes from Qara Yaaqoub (n=71)					
Unabraded	69	97.2%	*No edge damage*	2	2.8%
Slightly abraded	2	2.8%	*Slight edge damage*	38	53.5%
Moderately abraded	0	0.0%	*Moderate edge damage*	30	42.3%
Heavily abraded	0	0.0%	*Heavy edge damage*	1	1.4%
Unstained	21	29.6%	*Unpatinated*	0	0.0%
Lightly stained	28	39.4%	*Lightly patinated*	12	16.9%
Moderately stained	18	25.4%	*Moderately patinated*	38	53.5%
Heavily stained	4	5.6%	*Heavily patinated*	21	29.6%
Unscratched	66	93.0%			
Lightly scratched	2	2.8%			
Moderately scratched	3	4.2%			
Heavily scratched	0	0.0%			

Table 9.5.3 Condition of handaxes from Qara Yaaqoub.

	Abrasion	Edge Damage	Staining	Patination	Scratching
QY 1656	None	Moderate	Moderate	Moderate	None
QY 975	None	Moderate	None	Moderate	None
QY 1779	None	Moderate	Slight	Moderate	None

Table 9.5.4 Condition of flakes from Qara Yaaqoub.

The selected artefacts studied from Qara Yaaqoub are in a broadly analogous condition state (see tables 9.5.2, 9.5.3 and 9.5.4). The vast majority are unabraded (97.3%), and none show signs of fluvial reworking. Despite this, most display evidence of edge damage (98.2%), with a significant number (41.1%) exhibiting at least moderate levels. This indicates that the artefacts may have suffered from trampling, having lain on the landsurface for some time. Futhermore, some of the artefacts display surface scratching potentially caused by exposure to sub-aerial processes (*cf.* Stapert 1976); this may also account for the fact that all of the artefacts are patinated, many (83.0%) at least moderately so (significantly the Neolithic material amongst the collection from the Qara Yaaqoub findspots is generally unpatinated; personal observation).

On the whole, the taphonomic data for the material studied from Qara Yaaqoub indicates that it can be treated as a single assemblage (although this does not mean that it accumulated at the same time). In addition, the physical characteristics of the artefacts support the contention that they were discarded on the surface of the Qara Yaaqoub gravels at some time after they were deposited.

Technology of lithic assemblage

Raw Material

	Levallois cores (n=37)	Simple prepared cores (n=1)	Handaxes (n=71)	Levallois flakes (n=3)
Raw material				
Fresh	0.0%	0.0%	1.4%	0.0%
Derived	94.6%	100%	71.8%	0.0%
Indeterminate	5.4%	0.0%	26.8%	100%
Blank form				
Nodule	10.8%	100%	39.4%	-
Shattered Nodule	0.0%	0.0%	1.4%	-
Flake	0.0%	0.0%	0.0%	-
Thermal flake	0.0%	0.0%	0.0%	-
Indeterminate	89.2%	0.0%	59.2%	-

Table 9.5.5 Raw material and inferred blank form for artefacts studied from Qara Yaaqoub.

All the artefacts studied from Qara Yaaqoub are on coarse-grained chert/flint, most of which were obtained from gravel, such as that found in the immediate area (see table 9.5.5). It is, however, interesting to note that one of the handaxes studied from Qara Yaaqoub is on a chert/flint blank obtained from a primary bedrock source, the nearest known source of such is located ~24 km to the north-east at Tellik in the Euphrates Valley (Ponikarov *et al.* 1966, 30; 1967, 67). This indicates that some artefacts were brought into the area from elsewhere in the wider landscape.

Levallois Cores

	Length (mm)	Breadth (mm)	Thickness (mm)	Weight (grams)	Elongation (B/L)	Flattening (Th/B)
Mean	73.7	66.4	31.4	184.8	0.92	0.47
Median	71.1	61.2	22.8	118.0	0.92	0.44
Min	51.0	49.4	28.5	47.0	0.68	0.32
Max	136.1	116.6	61.2	917.0	1.20	0.74
St.Dev.	19.2	15.3	9.6	174.7	0.13	0.11

Table 9.5.6 Qara Yaaqoub Levallois cores summary statistics (n=37).

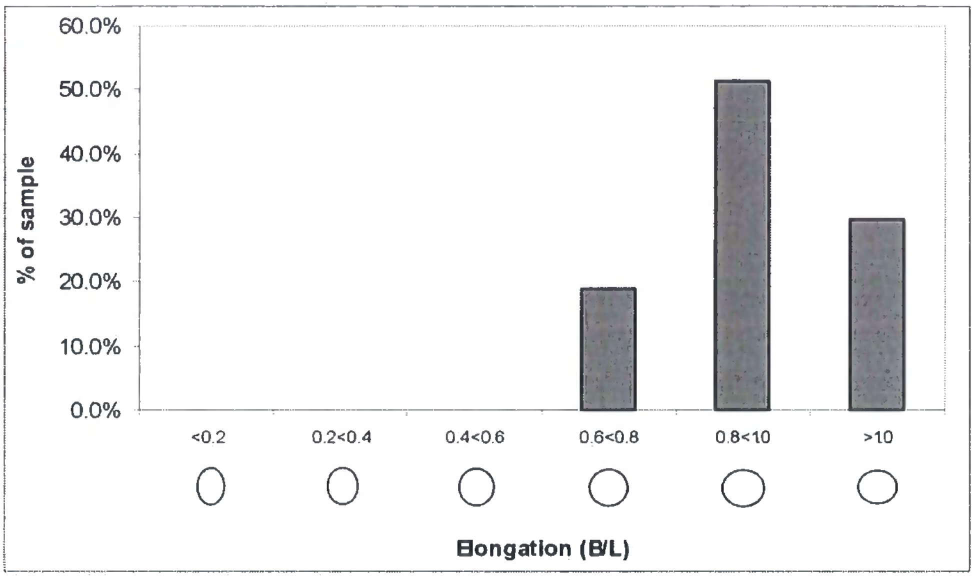

Figure 9.5.3 Elongation of Levallois cores from Qara Yaaqoub (n=37).

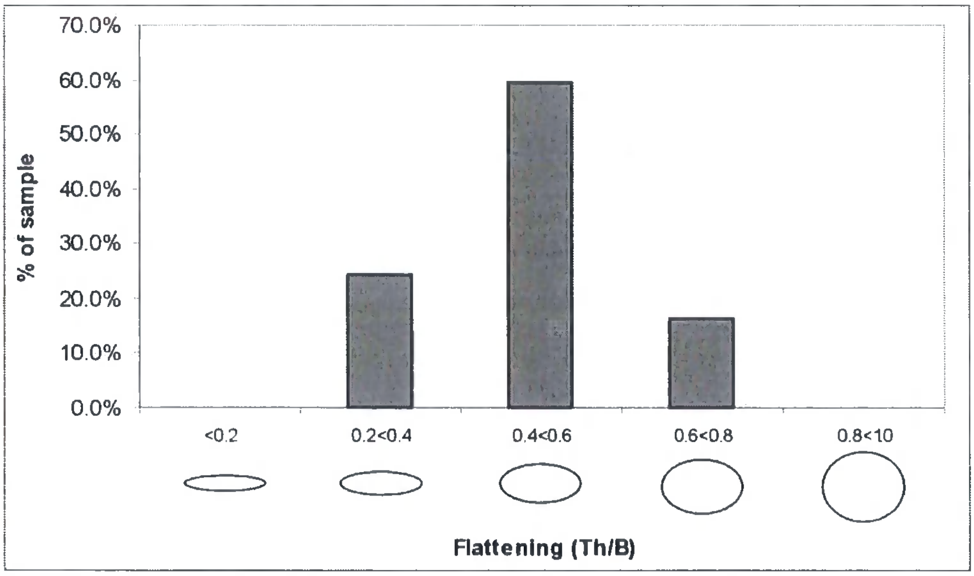

Figure 9.5.4 Flattening of Levallois cores from Qara Yaaqoub (n=37).

A total of 37 Levallois cores were identified amongst the material studied from Qara Yaaqoub. They tend to be relatively small (see table 9.5.6), albeit larger than those found at other Middle Palaeolithic sites discussed in this chapter, and round in planform (see figure

9.5.3). Although some were fairly thin when discarded (see figure 9.5.4), further reduction of a proportion of the assemblage was also clearly possible. Extended working of these relatively thick cores was not undertaken; this may be related to their small size, which meant that any attempt at reconfiguring the cores' striking platforms would have resulted in a concomitant reduction in their flaking surfaces, leading to the creation of small end-products. Notably, the fact that these cores were not worked further suggests that medium-large sized products were desired by the Qara Yaaqoub knappers.

Levallois cores; technological observations (n=37)							
Preparation method (n=37)			Exploitation method (n=37)				
Unipolar	1	2.7%	*Unexploited*			2	5.4%
Bipolar	8	21.6%	*Lineal*			21	56.8%
Convergent unipolar	4	10.8%	*Unipolar recurrent*			3	8.1%
Centripetal	24	64.9%	*Bipolar recurrent*			1	2.7%
			Re-prepared but unexploited			5	13.5%
			Failed			5	13.5%
Preparatory scars on flaking surface (n=37)			Preparatory scars on striking platform (n=37)				
1-5	13	35.1%	1-5			6	16.2%
6-10	24	64.9%	6-10			23	62.2%
>10	0	0.0%	11-15			7	18.9%
			>15			1	2.7%
Position of cortex on striking platform (n=37)			Percentage cortex on striking surface (n=37)				
None	2	5.4%	0			2	5.4%
One edge only	1	2.7%	1-25%			8	21.6%
More than one edge	1	2.7%	26-50%			8	21.6%
All over	8	21.6%	51-75%			11	29.8%
Central	7	19.0%	>75%			8	21.6%
Central and one edge	10	27.0%					
Central and more than one edge	8	21.6%					
Levallois products from flaking surface (n=37)			Types of Levallois products from core (n=37)				
0	12	32.4%	*Unexploited*			7	18.9%
1	21	56.8%	*Flake*			24	64.9%
2	4	10.8%	*Point*			1	2.7%
			Failed			5	13.5%
Earlier flaking surface (n=37)							
Yes	3	8.1%	Dimension of final Levallois products (n=27)				
No	34	91.0%	*Min Length*	32.7	*Min Breadth*	27.3	
			Max Length	97.9	*Max Breadth*	87.1	
Remnant distals on striking platform (n=37)			*Mean Length*	55.0	*Mean Breadth*	42.4	
Yes	0	0.0%					
No	37	100%					

Table 9.5.7 Technological observations for Levallois cores from Qara Yaaqoub.

The technological attributes of the Levallois cores from the Qara Yaaqoub findspots (summarized in table 9.5.7) suggest that they generally result from the far end of the reduction spectrum. This is indicated by the fact that a third (35.2%) are prepared/re-prepared but unexploited, or retain evidence of a failed final removal, and by the observation that a significant number (64.9%) display evidence of centripetal preparatory strategies, which have been suggested to be common towards the end of Levallois reduction sequences (*cf.* Baumler 1988, Meignen and Bar Yosef 1991, Hovers 1998). When coupled with the fact that all the Levallois cores from Qara Yaaqoub are on immediately available, derived, river cobbles (see table 9.5.5), this suggests that complete technological sequences for many Levallois cores (from raw material procurement to discard) occurred at the findspots. However, the presence of a significant number of unexploited cores amongst the material also hints at a more extended *chaîne opératoire*. These cores may have been worked in the wider landscape and discarded at Qara Yaaqoub, where raw material was immediately available in abundance. In addition, it is possible that Levallois cores produced on the blanks available at the sites were transported and used elsewhere.

Significantly, this data suggests that the Levallois cores from Qara Yaaqoub reflect similar technological and behavioural practices as those found at the other Middle Palaeolithic sites discussed in this chapter (see sections 9.2, 9.3 and 9.4). However, subtle differences are also apparent; the cores from Qara Yaaqoub are slightly larger, and more blows were employed in order to shape their striking platforms - as is evident from the slightly elevated number of scars retained upon these surfaces. This suggests that the nodules used were also slightly larger than those available at other locales. However, the fact that no cores from the findspots retain the remnant distal portions of larger scars on their striking platform surface suggests that the Qara Yaaqoub cores are the product of limited working of small and medium-sized clasts, rather than the repeated reworking of large blocks, as seems to be common at similar sites in the Orontes Valley (see chapter six). Consequently, the Levallois cores from Qara Yaaqoub can be seen to reflect the application of the same reduction strategies as those employed at locales in the Euphrates Valley, albeit to slightly larger blanks which, nevertheless, did not often permit repeated reworking.

Simple Prepared Cores

	Length (mm)	**Breadth (mm)**	**Thickness (mm)**	**Weight (grams)**	**Elongation (B/L)**	**Flattening (Th/B)**
QY 1767	63.8	57.2	25.2	91.0	0.90	0.44

Table 9.5.8 Qara Yaaqoub simple prepared core summary statistics.

A single simple prepared core was identified amongst the material studied from Qara Yaaqoub. The fact that only one such core was identified in the collection may be significant, since these cores seem to be common in typo-technologically Middle Palaeolithic assemblages from locations in the Euphrates Valley where particularly diminutive clasts were exploited (e.g. Chnine East 1; see section 9.3). Consequently, the lack of such cores at Qara Yaaqoub supports the suggestion that moderately sized nodules were more common at these findspots.

The core itself is relatively small, round in planform and quite flat (see table 9.5.8). Although the flaking surface could have been reconfigured to allow further working (thus making it volumetrically a Levallois core), its small size would have meant that if this were attempted, diminutive products would have been produced. As the Levallois core data suggests at least medium-sized products were desired by the Qara Yaaqoub knappers (see above), this probably explains why further flake production was not attempted.

Levallois Products

	Type	Portion	Butt	Prep. scars	Prep. method	Exploit. method	Length (mm)	Breadth (mm)	Thick. (mm)	Elong. (B/L)
1	Blade	Whole	Chap. de Gend.	3	Converg unipolar	Single removal	71.3	45	14.2	0.63
2	Flake	Whole	Facett.	4	Centrip.	Single removal	66.5	59	12.7	0.89
3	Over-shot	Whole	Facett.	8	Centrip.	Lineal	54.2	57.6	9.7	1.06

Table 9.5.9 Summary statistics and technological observations for definite Levallois products from Qara Yaaqoub.

Three definite Levallois products were identified amongst the artefacts from the Qara Yaaqoub findspots (see table 9.5.9). They consist of metrical blade with a *chapeau de gendarme* butt, a flake, and an overshot flake. They are either medium-sized or relatively small and, therefore, could have been produced from Levallois cores from the sites. The fact that there are so few definite Levallois flakes amongst the collection is notable (particularly as Levallois cores are found in relative abundance) and might suggest that such products were removed and used in the wider landscape. However, collection bias may also have had an influence on this.

Handaxes

	Length (mm)	Breadth (mm)	Thickness (mm)
Mean	90.5	64.9	38.8
Median	87.3	63.0	38.0
Min	64.6	42.7	22.2
Max	120.3	92.5	56.5
St.Dev.	14.2	10.4	9.4

Table 9.5.10 Qara Yaaqoub handaxe summary statistics (n=60, fragments and roughouts excluded).

The material studied from Qara Yaaqoub contains a large collection of handaxes, including sixty complete examples. These tend to be relatively small (see table 9.5.10). In terms of planform, 41.7% can be described as points and 58.3% as ovates; however, it should be noted there is significant overlap between the two groups, as most of the pointed forms tend to be rounded in outline, whilst many of the ovates have pointed tips (see figure 9.5.5). Notably, the levels of refinement which these handaxes display varies according to the percussor used in their production, with those produced using a soft hammer generally being more refined than examples produced using a hard hammer (see figures 9.5.6).

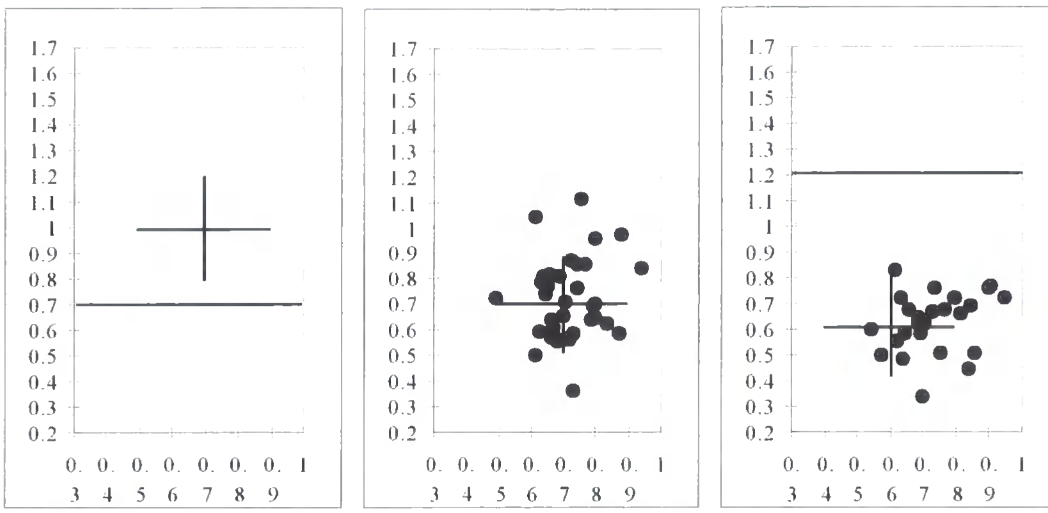

Figure 9.5.5 Tripartite diagrams for whole handaxes studied from Qara Yaaqoub (n=60).

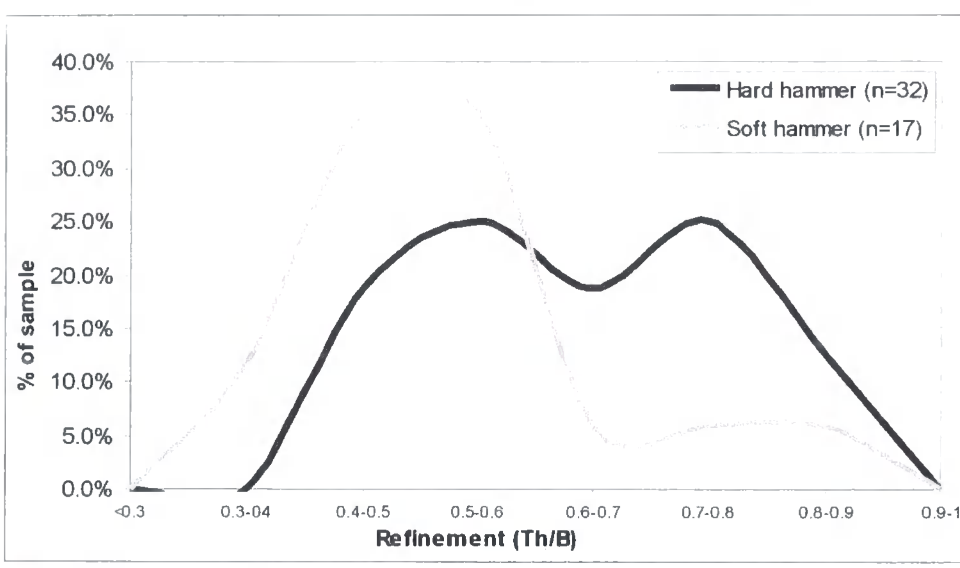

Figure 9.5.6 Levels of refinement for whole hard and soft hammer handaxes studied from Qara Yaaqoub (note - eleven examples displaying evidence of both hard and soft hammer working were also encountered).

The technological observations made for the Qara Yaaqoub handaxes are summarized in table 9.5.11. The assemblage is dominated by complete handaxes (84.6%); some are produced using a hard hammer (53.5%), others a soft hammer (26.8%), whilst most of the remainder display evidence of working with both types of percussor (18.3%). Given the fact that the hard hammer handaxes are generally less refined than the soft hammer handaxes (see above), it is possible that examples produced using different modes of percussion reflect a continuum of working from hard hammer roughing out to soft hammer finishing. However, if this were the case, then the hard hammer handaxes should be significantly larger than the soft hammer examples. As both groups are roughly the same size (data not presented), it seems all the complete handaxes from Qara Yaaqoub are fully worked, and that differences in hammer mode actually reflect technologically distinct approaches to production.

Handaxes; technological observations (n=71)					
Portion (n=71)			Hammer mode (n=71)		
Whole	60	84.6%	*Hard*	38	53.5%
Roughout	2	2.8%	*Soft*	19	26.8%
Tip	3	4.2%	*Mixed*	13	18.3%
Butt	1	1.4%	*Indeterminate*	1	1.4%
Fragment	5	7.0%			
Cortex retention (n=60)			Cortex position (n=14)		
0	10	16.7%	*None*	11	18.3%
1-25%	35	58.3%	*Butt only*	20	33.3%
26-50%	14	23.3%	*Butt and edges*	1	1.7%
51-75%	1	1.7%	*Edges only*	1	1.7%
>75%	0	0.0%	*On face*	8	13.3%
			All over	19	31.7%
Evidence of blank dimensions? (n=60)			Edge Position (n=60)		
No	27	45.0%	*All round*	17	28.3%
1 dimension	13	21.7%	*All edges sharp, dull butt*	13	21.7%
2 dimension	20	33.3%	*Most edges sharp, dull butt*	11	18.3%
			One sharp edge, dull butt	7	11.7%
Butt working (n=60)			*Irregular*	1	1.7%
Unworked	20	33.3%	*Most edges sharp, sharp butt*	6	10.0%
Partially worked	20	33.3%	*One sharp edge, sharp butt*	2	3.3%
Fully worked	20	33.3%	*Tip only*	3	5.0%
Length of cutting edge in mm (n=14)			Scar Count (n=60)		
Min	8	-	*Min*	6	-
Max	35	-	*Max*	30	-
Mean	17.3	-	*Mean*	18.2	-

Table 9.5.11 Technological observations for handaxes from Qara Yaaqoub.

The evidence suggests that the handaxes from Qara Yaaqoub are frequently the product of relatively extended episodes of flaking. Although most (83.3%) retain some cortex, this tends to cover less than 26% of the handaxe and be restricted to the butt (58.3%) or be found in patches located all over the artefact, with the result that the majority (59.2%) do not retain the form of the original blank (see table 9.5.5). Futhermore, they generally possess fairly high scar counts (average = 18.2) and sharp margins all around their circumference (28.3%), or most of their edges (40.0%). This indicates that, although small at the point of discard, many of the handaxes from Qara Yaaqoub were produced by relatively intense working of at least medium-sized blocks (although the fact that a third which fall within the same size-range retain enough cortex allow the original blank to be recreated in two dimensions indicates that smaller nodules were also exploited).

As 71.8% of the Qara Yaaqoub handaxes possess scraps of water-worn cortex on their surface (see table 9.5.5), the most prosaic source of raw material seems to be the gravels upon which the artefacts were found. This suggests that most were discarded where they were made. However, it is notable that one handaxe possesses fresh chalky cortex, indicating that it was brought into the area from elsewhere (see table 9.5.5). Futhermore, the fact that the Qara Yaaqoub collection appears to be dominated by finished handaxes is at odds with the evidence provided by typo-technologically Middle Palaeolithic assemblages from sites in the Orontes Valley which contain large numbers of handaxe fragments and roughouts (e.g. Tahoun Semaan 2 and 3, and Tulul Defai; see chapter six, sections 6.2 and 6.3), and at which handaxe manufacture seems to have frequently taken place. Given the nature of recovery (surface grab sample), the general dominance of finished handaxes amongst the material from Qara Yaaqoub may, of course, simply reflect collection bias (although it is worth noting that the Orontes material was collected in the same manner, by the same collectors). However, although it is likely that some of the Qara Yaaqoub handaxes were produced and discarded at the site, the possibility exists that others (and not just the example on fresh chert/flint) may have been discarded at the site following use in the wider landscape.

Technology and Hominin Behaviour

As is the case with the other typo-technologically Middle Palaeolithic collections discussed in this chapter, that from Qara Yaaqoub is associated with a source of raw material - the surface of pre-existing fluvial gravels. Again, Levallois flaking is commonly employed; it is notable, however, that handaxes are abundant amongst the material from the Qara Yaaqoub findspots, whilst they are rarer at the other sites discussed in this chapter.

Although the Levallois cores from Qara Yaaqoub are slightly larger at the point of discard than those from the other sites discussed previously, and were produced on medium-sized (rather than small) nodules, they are broadly analogous technologically. They therefore reflect limited phases of exploitation, rather than the recurrent flaking of larger blocks (such as was practiced at sites in the Orontes Valley; see chapter six). It is notable that although the sites have produced many Levallois cores there are actually very few Levallois products; this might suggest that these may have been taken away for use elsewhere in the landscape.

The handaxe assemblage itself can also be contrasted with those obtained from equivalent findspots in the Orontes Valley; whilst these sites (see chapter six) produced large numbers of broken handaxes and roughouts, Qara Yaaqoub is dominated by whole examples. Possible collection issues aside (see above), this might suggest that Qara Yaaqoub represents a location at which handaxes were rarely manufactured, but were discarded in some numbers. It is also notable that so many handaxes were recovered from this locale. Given their apparent paucity at other Middle Palaeolithic findspots in the Euphrates Valley; this probably reflects the relative size of available raw material. That available at other Middle Palaeolithic sites discussed in this chapter is extremely small, whereas the landscape catchment which includes Qara Yaaqoub clearly yielded larger blanks.

9.6 Summary of the Middle Palaeolithic Occupation in the Euphrates Valley in Syria

The Middle Palaeolithic sites from the Euphrates Valley presented here are technologically diverse in comparison to the Lower Palaeolithic sites from the same area, yet also reflect the impact of the raw material available throughout the Euphrates catchment upon the technological options available. Contrasts are therefore apparent with the variable strategies documented within the Middle Palaeolithic of the Orontes Valley (see chapter six), where larger clasts were more commonly available. These relate not only to the on-site actions documented within these collections, but also to broader patterns of landscape-use. However, the Middle Palaeolithic of the Euphrates Valley is by no means monotonous; all sites reflect a variety of approaches to stoneworking - Levallois and simple prepared core reduction, more *ad hoc* approaches to flaking, as well as occasional handaxe production - but the specific manner in which these strategies were enacted varied according to the particular limitations imposed by each place.

All the sites considered here can be viewed as palimpsests; all are located directly on top of raw material outcrops (terrace gravels) and all reflect complete reduction sequences, from decortication through to discard. However, specific artefacts can be seen as having been brought into (or even carried through) these sites; non-Levallois cores were brought into Rhayat 2, exotic flakes were discarded at Chnine East 1, and handaxes appear to have been discarded, but not produced, at Qara Yaaqoub. It is thus possible to view these sites as significant nodal points within their particular landscape catchments, and as having played important roles in hominin itineraries for prolonged periods of time. The particular affordances of these places impacted strongly upon the tasks which were undertaken at each of them.

The raw material available at the sites considered here was limiting to a greater or lesser degree, with concomitant implications for the technological actions undertaken at each locale. The preponderance of simple prepared cores at Rhayat 2, rather than cores with deliberately configured Levallois surfaces, reflects the extreme small size of the available gravel clasts. Where raw material was available in larger blocks, not only are technological strategies more variable, but they also vary according to clast-size within and between particular find-spots. Thus fully-prepared Levallois surfaces were commonly created at Qara Yaaqoub, and at Chnine East 1, a continuum of reduction strategies is apparent which can be directly related to selected clast volume. The smallest clasts were only subject to a single phase of flaking, exploiting one surface, whilst the largest were most intensively worked, flakes being removed from all around their periphery, and effectively becoming discoidal at the point of discard. Across the River Balikh at Chnine West 1, larger clasts permitted fully prepared Levallois surfaces to be more frequently configured.

All of the sites considered here are located in places at which the available raw material had limited reductive potential. This is a situation which is very different to that documented in the Orontes, where the river catchment cuts through diverse sources of bedrock raw material, incorporating varied material into the bedload of the river. As a result, a variety of raw material sources were exploited, which on the whole tend to produce larger clasts than the Euphrates sites, with greater reductive potential. The technological patterns apparent at Orontes sites predominantly reflect hominins equipping themselves at these places, and moving out into the wider landscape carrying cores, handaxes and flakes. Levallois cores, in particular, were subject to extended flaking; large initial blanks allowed repeated re-preparation and exploitation, exhausted cores being discarded upon return to raw material outcrops. In contrast, the Euphrates Valley sites reflect a greater emphasis upon within-site reduction and discard; cores are worked as far as they can be on-site, and if anything, flakes and not cores are exported. The productive potential of many of these small cores was immediately compromised following a single episode of reduction, and therefore there would be little point in carrying them around.

Arguably, the structure of the raw material available within the catchment of the Orontes and Euphrates Valleys had an impact upon the landuse strategies followed by hominin groups. Within the Orontes, larger raw material allowed for extended curation, and potentially permitted hominins to range away from available sources for extended periods of time. In contrast, transportable cores as the source of future products could not generally be manufactured in the Euphrates catchment, and whilst flakes may have been carried, it is likely that tool kits needed replacing - and raw material outcrops revisiting - more frequently. Considering the Euphrates and Orontes sites together thus allows a fuller appreciation of the flexible way in which hominin lives were adapted to the contingencies of the landscapes within which they found themselves.

Chapter 10
Discussion

10.1 Introduction

The earlier Palaeolithic record of Syria and the wider Near East has often been regarded simply as a means of tracking human dispersals out of the African continent, and as a dataset to illustrate broad chrono-cultural trends in technological evolution. Arguably, this has created a perception of the region as a mere staging-post along humanity's long progress to technological and behavioural modernity. However, this study demonstrates that the earlier Palaeolithic of Syria is worthy of study in its own right, as it consists of rich and diverse datasets capable of providing significant insights into hominin technological behaviour and landuse practices. Furthermore, this research has demonstrated that if the full potential of these assemblages is to be realised, new methodological and theoretical perspectives are required which acknowledge, and allow investigation of, the fact that early human behaviour is contextually specific and inherently variable.

This study has focussed on aspects of earlier Palaeolithic behaviours illustrated by lithic assemblages from the Orontes and Euphrates Valleys. However, the implications of this research extend far beyond these two river systems; the following discussion therefore aims to place the issues raised in this research within a broader Near Eastern context. In order to achieve this, several important issues are discussed. Firstly, consideration is given to the nature of occupation, and the technological strategies, associated with the first human groups to occupy the region. A re-appraisal is then provided of the technological variability of the Near Eastern Lower Palaeolithic as a whole. This is then followed by a reassessment of hominin behaviour and landscape-use practices during this period. The subsequent sections focus on aspects of Middle Palaeolithic technological decision making and landscape-use. The contribution of this study to wider regional debates relating to Middle Palaeolithic technological repertoires is then assessed; particular consideration is given to the origins of Levallois technology and the meaning of the variability which develops within this technological system. Finally, a discussion is presented which investigates how this study contributes to emergent pictures of Middle Palaeolithic behavioural diversity and landuse practices in the Near East.

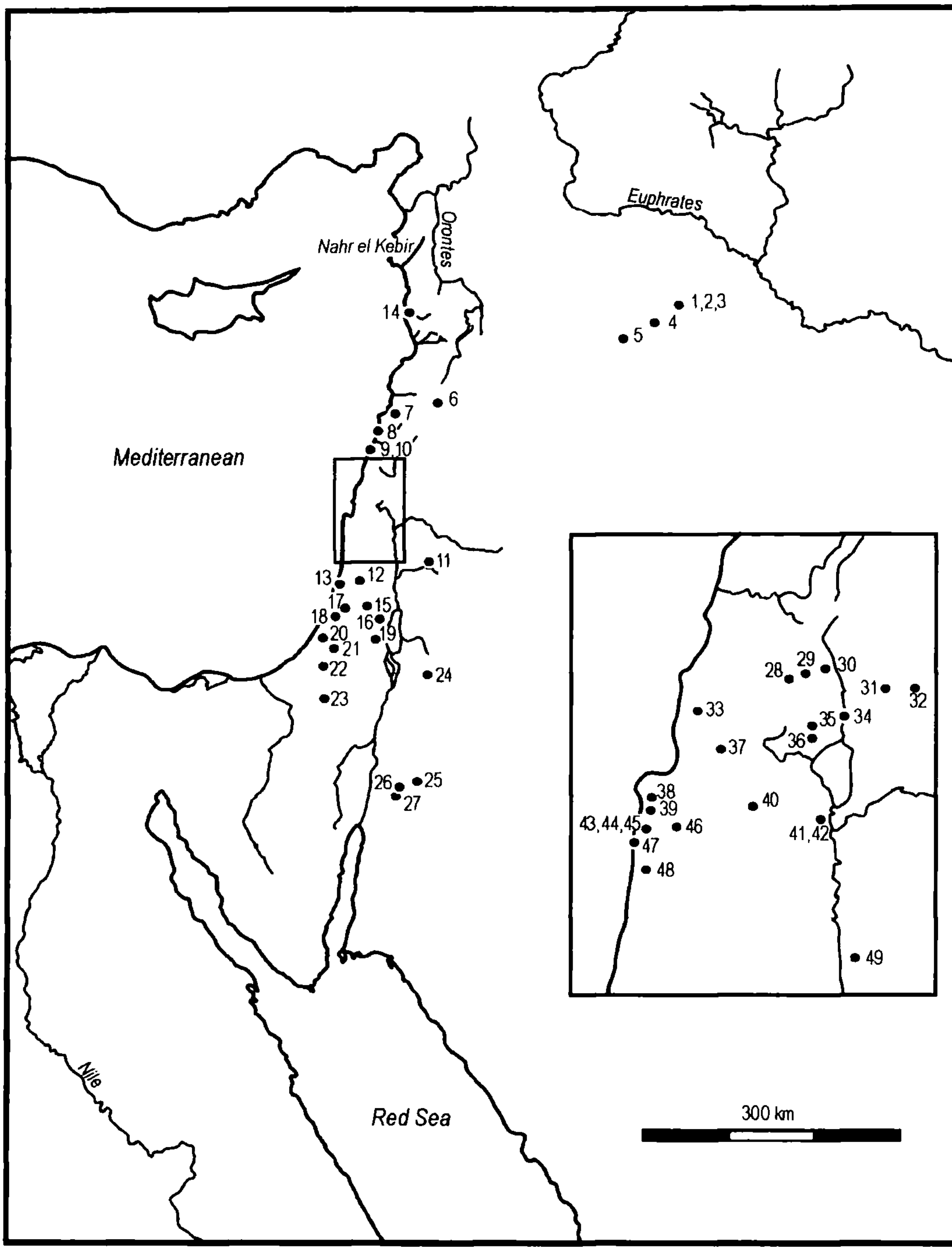

Figure 10.1.1 Location map showing the position of all Near Eastern sites referred to in chapter ten:

1. *Hummal*
2. *Umm el Tlel*
3. *Nadaouiyeh*
4. *Jerf Ajla*
5. *Doura*
6. *Yabrud*
7. *Ksar Akil*
8. *Borj Qinnarit*
9. *Abri Zumoffen*
10. *Bezez*
11. *Sukhne North*
12. *Qesem*
13. *Holon*
14. *Amrit*
15. *Emeq Refaim*
16. *Bethlehem*
17. *Kafer Menahem*
18. *Revadim*
19. *Abu Sif*
20. *Kissufim*
21. *Bizat Ruhama*
22. *Far'ah II*
23. *Rosh Ein Mor*
24. *'Ain Difla*
25. *Tor Sabiha*
26. *J447*
27. *Tor Faraj*
28. *Baram*
29. *Yiron*
30. *El Hamari*
31. *Birket Ram*
32. *Quneitra*
33. *Evron Quarry*
34. *Jisr Banat Yaqub*
35. *Amud*
36. *Zuttiyeh*
37. *Hayonim*
38. *Tirat Carmel*
39. *Misliya*
40. *Qafzeh*
41. *'Ubeidiya*
42. *Erq el Ahmar*
43. *Tabun*
44. *Skhul*
45. *Jamal*
46. *Oumm Zinat*
47. *Habonim*
48. *Kebara*
49. *Ar Rasafa*

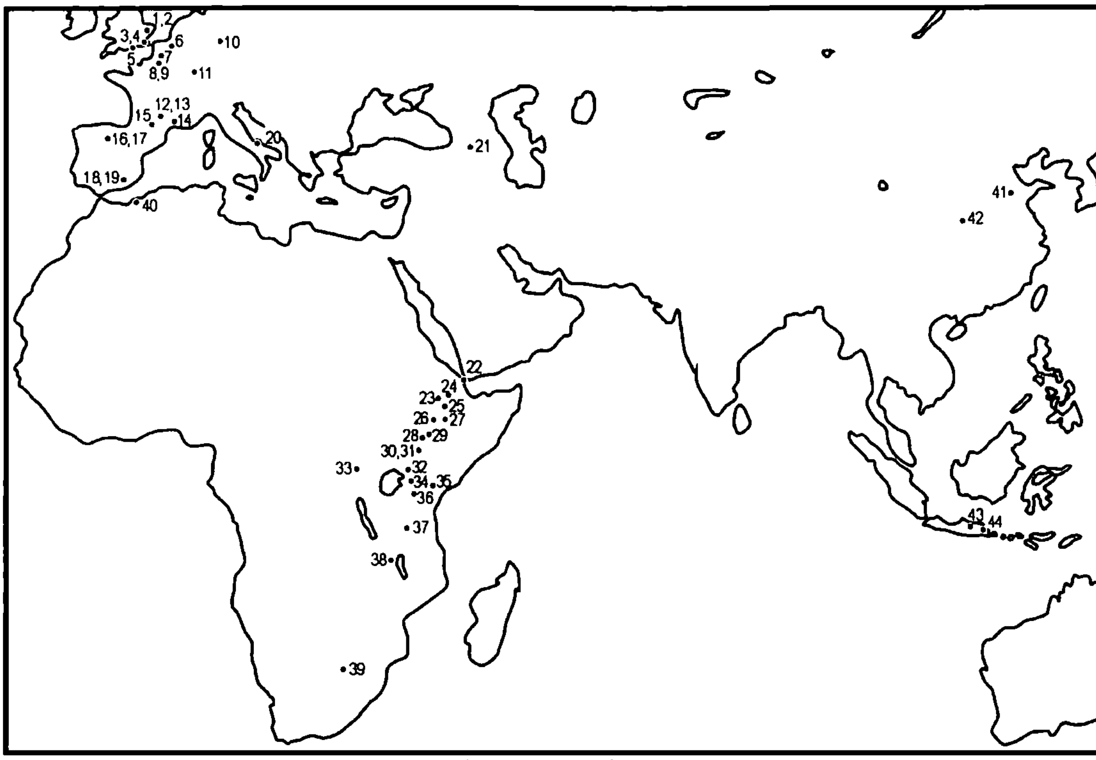

Figure 10.1.2 Location map showing the position of all sites outside of the Near East referred to in chapter ten:

1. Barnham
2. Beeches Pit
3. Baker's Hole
4. Purfleet
5. Boxgrove
6. Maastricht-Belvédère
7. Mesvin IV
8. Cagny-la-Garenne
9. Ferme de l'Epinette
10. Markleeberg
11. Achenheim
12. Coudoulous
13. La Borde
14. Orgnac 3
15. Mauren
16. Trinchera Dolina
17. Sima del Elefante
18. Fuente Nueva 3
19. Barranco Léon
20. Pirro Nord
21. Dmanisi
22. Bab el Mandeb
23. Gona
24. Hadar
25. Middle Awash
26. Melka Kunture
27. Gadeb
28. Omo
29. Konso Gardula
30. Lokalelei
31. Kokiselei 4
32. Kapthurin Formation
33. Senga 5a
34. Olorgesailie
35. Isenya
36. Olduvai Gorge
37. Isimila
38. Mwanganda
39. Sterkfontein
40. Tighenif
41. Xiaochangliang
42. Gongwangling
43. Sangiran
44. Mojokerto

10.2 "Out of Africa" or the heartlands of "Savannahstan"? - The earliest occupation of Syria in its global context

The archaeology of the earliest tool making hominins is perhaps one of the most hotly contested and controversial topics in Palaeolithic research. One of the few issues on which there is general agreement is that the earliest stone tools appear in East and Central Africa at sites currently dated to between ~2.30 mya and ~2.60 mya. These early artefact occurrences include those recovered from sites associated with the Kada Hadar Member, Hadar Formation, Ethiopia (Harris 1986, Isaac 1984, Kimbel *et al.* 1996, Semaw *et al.* 1997); Member F of the Shungura Formation, Omo, Ethiopia (Isaac 1984, Howell *et al.* 1987); the Kalochoro Member of the Nachukui Formation at Lokalelei in the West Turkana Basin, Kenya (Kibunjia 1994) and from the Lusso Beds found at Senga 5a, Congo (Boaz *et al.* 1992, Harris *et al.* 1987). Furthermore, there is now a general consensus that sometime before 1 mya tool-making hominins appear at sites outside this core area (Kuman 1994, Gabunia *et al.* 2000, Larick *et al.* 2001, Zhu *et al.* 2001, Belmaker *et al.* 2002, Hyodo *et al*, 2002, Dennell and Roebroeks 2005, Rightmire *et al.* 2006, Roebroeks 2006); however, the nature, timing, impetus, behavioural implications, technology and even the species of hominin involved in this expansion are all open to debate.

Due to its location at the northern end of the East African Rift Valley, on the edge of what could be termed the "cradle" of early hominin evolution, the Near East is a region of central importance to these debates. Yet, with a small number of notable exceptions, surprisingly few hominin fossils or artefact occurrences assigned to this remote period have been recognized. This is particularly true of the northern part of the region, including Syria. As a result, the earliest Palaeolithic occurrences considered in this study (particularly those from the Euphrates Valley), although not in themselves particularly spectacular, are potentially very significant.

Site	River Valley	Preferred date	No. of cores	No. of handaxes	No. of flakes
Maadan 1	Euphrates	?>1.20 mya	25	0	44
Maadan 5	Euphrates	?>1.20 mya	1	0	5
Ain Abu Jemaa	Euphrates	1.20-0.85 mya	84	10	261
Ain Tabous	Euphrates	1.20-0.85 mya	55	7	158
Hamadine	Euphrates	1.20-0.85 mya	61	14	250
Rastan	Orontes	<0.66->0.37 mya	56	0	76
Latamne "Living floor"	Orontes	0.43-0.37 mya	122	50	908

Table 10.2.1 Early artefact occurrences in the Euphrates and Orontes Valleys, Syria (artefact counts refer to number of pieces analysed during this study).

Table 10.2.1 lists the earliest artefact occurrences currently identified in both the Orontes and the Euphrates Valleys in Syria, and the preferred dates followed here. All have been analysed in this study (for specific information regarding the location and dating of these sites see chapters five and eight). It will be observed that the earliest sites currently identified in the Orontes Valley post-date those found in the Euphrates Valley by over half a million years[1]. The actual significance of this chronological gulf is debatable; it could, of course, be

[1] Although earlier material from the Orontes has previously been identified (e.g. Copeland and Hours, 1993), reanalysis of the extant collection failed to identify any artefacts that could be definitively stated to be the result of human manufacture; see chapter five, section 5.2.

interpreted as suggesting a much earlier hominin presence in the Euphrates Valley than in the Orontes. However, given the limited amount of fieldwork carried out in both areas, such a claim must to be treated with extreme caution. What is clear is that the early artefact occurrences from the Euphrates amplify the evidence for a hominin presence in the Near East prior to 0.80 mya, expanding the extremely small corpus of extant sites.

The earliest widely accepted evidence for a hominin presence in the region comes from 'Ubeidiya, located in the Jordan Valley, and dated to ~1.40 mya (Belmaker *et al.* 2002, 45-47 and references therein)[2]. This site has produced in excess of 8,000 artefacts (Bar-Yosef and Goren-Inbar 1993, figure 39), as well as some fragmentary hominin remains (Tobias 1966, Belmaker *et al.* 2002), from a sequence of lake shore and delta deposits (Bar-Yosef and Goren-Inbar 1993, 14-15) some ~154 m thick (Picard and Baida 1966, 5-8). It is nonetheless notable that 'Ubeidiya is the only site in the Near East currently attesting to an unequivocal human presence prior to 0.80 mya. Most other sites in the region that have been attributed to this period lack convincing biostratigraphic or radiometric age control. These include Sukhne North, which has produced 145 artefacts from a section through fluvial deposits located in a tributary valley of the River Jordan (Parenti *et al.* 1997); Borj Qinnarit which has produced 17 artefacts from raised beach deposits located south-east of Sidon on the Lebanese coast (Hours and Sanlaville 1972, Hours 1975, 252) and Kafer Menahem which is located along the southern stretch of the Levantine coastal plain and has produced over 2,000 artefacts from *hamra* (red sandy loam soil) and an underlying conglomeratic sandstone deposit (Gilead and Israel 1975). Sukhne North, for instance, is dated on the basis of a small faunal assemblage comprising just four fragmentary teeth and a fragment of a long bone (Parenti *et al.* 1997, 17), whilst the assemblages from Borj Qinnarit and Kafer Menahem are assigned to the earlier Pleistocene simply on the basis of their stratigraphic association with high level raised beach deposits and their supposed typological affinities (Hours and Sanlaville 1972, Gilead and Israel 1975, 11, Horowitz 1979, 111).

In addition, it has been suggested that a small collection of artefacts recovered from gravel deposits at Yiron in Upper Galilee attest to a hominin presence in the region prior to 2.4 mya. This is based on the gravels found at the site apparently being overlain by a basalt flow dated by K/Ar to 2.39 mya (D. Mor pers. comm. quoted in Ronen 1991b). However, this claim should be treated with caution as the basalt does not overlie the gravels at the findspot;

[2] Earlier material may exist from the Erq el Ahmar Formation, also found in the Jordan Valley, which is currently thought to have accumulated between ~1.70 mya and ~2.00 mya, however, little information is currently available regarding the small core and flake assemblage from this site (Verosub and Tchernov 1991, Tchernov 1999, Ron and Levi 2001).

this stratigraphic relationship is only observed some ~80 m to the west (Ronen 2006, 344). Consequently, it is by no means certain that the implementiferous gravels predate the dated basalt exposure, nor is it certain that the artefacts are contemporary with the gravels; in this regard it is notable that the artefacts are in fresh, unabraded condition (Ronen 1991b, 161). It should be noted, however, that individual mint condition artefacts were recovered from spoil produced from machine cut trenches located adjacent to basalt exposures (Ronen 2006, 346).

Other than 'Ubeidiya, only two published artefact assemblages possess anything approaching robust (though by no means unequivocal) evidence of a potential hominin presence in the Near East prior to 0.80 mya; those from the sites of Evron Quarry and Bizat Ruhama. Evron Quarry is located on the Galilee coastal plain and has produced artefacts from a sandy deposit within *hamra* (Gilead and Ronen 1977, Ronen 1991a). Suggested dates for this artefact-bearing level have varied from ~0.16 to ~1.00 mya (Gilead and Ronen 1977, Tchernov *et al.* 1994, Sivan *et al.* 1999); however, recent sampling has demonstrated that the main archaeological horizon can be correlated with deposits displaying a reversed paleomagnetic signal (Ron *et al.* 2003). This, along with the fact that the transition to a normal paleomagnetic signal has been identified within *hamra* deposits that correlate with those found directly above the artefact bearing deposits, suggests that the archaeology from Evron predates the Brunhes/Matayama paleomagnetic reversal and, as a consequence, is older than 0.78 mya (Ron *et al.* 2003, 637). Similarly, Bizat Ruhama, located in the northern Negev, has produced an artefact assemblage comprising ~1,200 specimens from sandy deposits capping *hamra*, which according to two separate studies also displays a reversed paleomagnetic signal indicative of a pre-0.78 mya date (Ronen *et al.* 1998, 171, Laukhin *et al.* 2001, Ron and Gvirtzman 2001). Consequently, there is a distinct possibility that the archaeologically productive deposits from Evron and Bizat Ruhama date to earlier than 0.80 mya. However, further work is required in order to place these artefact occurrences securely within a specific time bracket.

As can be seen from this brief review, the current evidence for a hominin presence in the Near East datable to the period prior to 0.80 mya is limited. Furthermore, until now, no convincing evidence has been found for a hominin presence in the northern part of this region. Consequently, the fact that the current study has identified three artefact-bearing localities in the Euphrates Valley which can be broadly assigned to the period between 1.20 mya and 0.85 mya, along with two others which are likely to be at least as old, if not older, is significant. It certainly adds considerably to our fragmentary knowledge of early hominin occupation in the region.

In addition to contributing to the immediate regional evidence, a hominin presence in the Euphrates Valley by at least 0.85 mya (and potentially by 1.20 mya) contributes to, and fits well within, the pan-Eurasian distribution of early hominin sites. To the north of the Near East in the Georgian Caucasus, the site of Dmanisi has produced hominin remains and stone tools from volcaniclastic sediments currently thought to date to ~1.77 mya (Gabunia *et al.* 2000, Rightmire *et al.* 2006). Eastwards, in China, hominin remains and stone tools have been recovered from lacustrine silt and sands at Xiaochangliang, located in the Nihewan Basin north-west of Beijing, which are dated to ~1.36 mya (Zhu *et al.* 2001), and from loess deposits dated to ~1.15 mya, which are found north of the Qinling Mountains at Gongwangling near Lantian (An and Ho 1989, Wang *et al.* 1997). Furthermore, despite all the controversy and the undeniable problems with the early dates proposed by Swisher *et al.* (1994) for hominin fossils from Mojokerto and the Sangiran Dome in Java (see De Vos and Sondaar 1994, Sémah *et al.* 1997, Larick *et al.* 2001, Huffman *et al.* 2006), it is now likely that a hominin presence on the island can be identified by at least ~1.50 mya (Larick *et al.* 2001).

Turning westwards to Europe, evidence for a hominin presence from at least 0.78 mya, and potentially significantly earlier, has been recorded. For instance artefacts, and in some instances, hominin remains dateable to earlier than 0.78 mya have been recovered from several sites in Spain; Trinchera Dolina Level 6 (Carbonell *et al.* 1995) and Sima del Elefante (Parés *et al.* 2006), located on the Sierra de Atapuerca, east of the city of Burgos, as well as Fuente Nueva 3 (Navarro *et al.* 1997, Gibert *et al.* 2006, Agusti *et al.* 2007) and Barranco Léon (Oms *et al.* 2000, Gibert *et al.* 2006, Agusti *et al.* 2007), located in the Guadix-Baza basin between Granada and Murcia. However, further work is required at all these sites in order to firmly establish a time bracket within which the artefacts and hominin remains can be assigned. Interestingly, the potential antiquity of these sites is perhaps hinted upon by recent finds from the site of Pirro Nord, in southern Italy, which has produced a small artefact assemblage from material found a karst network that, on the basis of the associated fauna, is argued to have in-filled during the interval between ~1.30 mya and ~1.70 mya (Arzarello *et al.* 2006).

In addition to adding to the database of Lower Pleistocene sites in Eurasia, the early Euphrates sites identified in this study also contribute to some of the debates concerning the first hominin presence in this region. The earliest human presence outside Africa is currently thought to result from a complex process of hominin migrations, related to interdependent factors revolving around the appearance of a new species of hominin; *Homo erectus*. The growth in brain and body size associated with this obligate biped is argued to be a result of a shift to a higher quality diet involving animal products (Aiello and Wheeler 1995, De Heinzelin *et al.* 1999, Roche *et al.* 1999). Furthermore, increases in body size and diet quality have been shown to be intimately linked to significant increases in the size of primate home ranges, which may have been a critical factor in the rapid and widespread dispersal of *Homo erectus* (Antón *et al.* 2002), particularly as early hominin range expansion has also been linked to the need to retain a primate-like society consisting of sizeable local groups for safety whilst, like all carnivores, retaining low predator/prey densities (Rolland 1998, 193). In addition, these early dispersal events may form part of a series of early Pleistocene mammalian faunal exchanges between Eurasia and Africa (Kurten 1968, Tchernov 1992, Opdyke 1995, Vrba 1995) that have been linked to changes in global climate after ~2 mya. These resulted in more arid conditions in Africa (De Menocal 2004), leading to grassland expansion (Vrba 1995; Owen-Smith 1999) and an associated increase in herbivore biomass (Behrensmeyer *et al.* 1997).

On the basis of its geographic location between Africa, Europe and Asia, it seems clear that the Near East would have been of central importance in these early dispersal events. The Levantine corridor, in particular, has been highlighted as a significant dispersal route in the region, being frequently portrayed as the main arterial route linking the Near East to Africa (e.g. Bar Yosef 1994; 1998, Bar-Yosef and Belfer-Cohen 2001, Saragusti and Goren-Inbar 2001, Belmaker *et al.* 2002). However, it is questionable whether there would have been a direct connection between the Levant and North Africa during the Lower Pleistocene. Notably, the current earliest documented human presence in Egypt dates to less than ~0.50 mya (McHugh *et al.* 1988, Vermeersch 2001). Furthermore, the main channel of the Nile would not have been a suitable conduit for early hominin migrations emanating from East Africa until after ~0.80 mya as before this point the river did not extend to sub-Saharan Africa (Said 1993; 2-5). Indeed, it has also been suggested that due to a period of hyperaridity between ~1.80 mya and ~0.80 mya, the Nile did not even reach the Mediterranean, either having completely ceased to exist (Said 1993; 2-5) or become foreshortened and directed eastwards into the Red Sea (Butzer and Hansen 1968). This should not, however, be taken to mean that hominins did not enter the Near East by this route, but rather that other potential avenues should also be considered, the main one of which would involve hominins entering the region via the Arabian Peninsula.

It has long been recognized that during periods of glacio-eustactic low sea levels, early humans would have been able to cross the Bab el Mandeb Straits which separate East Africa from Arabia (e.g. Caton-Thompson 1953). However, the suggestion that this would have been a primary dispersal route has suffered from the lack of securely dated Lower

Pleistocene sites in Arabia. The dearth of such sites is perhaps not surprising, given that the area has received relatively little attention from Palaeolithic researchers. Consideration of the Palaeolithic record of this potentially important area is in its infancy. Significant quantities of lithic artefacts provide clear evidence of a hominin presence here during the earlier Palaeolithic, however, these consist largely of surface finds and are all undated (see Petraglia 2003 and Rose 2007). Although this study cannot directly contribute to whether or not this area was occupied during the Lower Pleistocene, the fact that it has identified sites datable to at least 0.85 mya in the Euphrates Valley is significant as its geographic location (see figure 10.1.2) may potentially be indicative of the presence of a connection between the Near East and East Africa via Arabia at this time.

A question related to this issue of early hominin dispersal routes is whether the earliest archaeological assemblages from the Euphrates Valley form part of a permanent hominin presence in the Near East before 0.80 mya, or whether such early sites reflect short-term forays out of Africa. Traditionally, an early hominin presence in the region has been viewed as the product of human groups intermittently expanding out of their core areas in East Africa (e.g. Goren-Inbar and Saragusti 1996, Bar-Yosef and Belfer-Cohen 2001, Saragusti and Goren-Inbar 2001). However, the validity of this interpretation is open to debate. It has been pointed out that as Lower Pleistocene faunal assemblages from the Near East, in particular those from Bethlehem in the Judean Hills (Hooijer 1958) and 'Ubeidiya (Tchernov and Guérin 1986; 1988), are indicative of an open grassland environment, an early hominin presence in the Near East can be regarded simply as the product of latitudinal dispersion into the type of habitats already utilised by Lower Pleistocene groups in East Africa (Dennell 2003, 431). This expansive grassland spread, encompassing eastern Africa and western Asia, has been referred to as "Savannahstan" (Dennell and Roebroeks 2005). Consequently, as early hominins in the Near East and East Africa were all living in broadly comparable grassland environments, it may be that the division between an East African core zone of Lower Pleistocene occupation and a surrounding periphery may be more reflective of modern geopolitical boundaries than Lower Pleistocene environments (Dennell and Roebroeks 2005, 1102).

When seen in this light, the early sites identified in the Euphrates Valley may constitute evidence of this range expansion across analogous environments. In addition, the fact that the five sites recorded in this study were identified during the course of a single field season in an area where relatively little research has been carried out (see chapter seven), raises the possibility that other sites of similar date may also exist. The relative dearth of Palaeolithic sites dateable to the period prior to 0.80 mya in the Near East may therefore be reflective of the patchy nature of the record, rather than intermittent occupation during this early period. Furthermore, these sites were investigated over 25 years ago, but can only now be assigned to this remote period, suggesting that other, presently undated artefact occurrence, of similar antiquity, may already exist in museum collections.

One final issue surrounding the earliest evidence of a hominin presence in the Near East, which is relevant to the present study, relates to the lithic technology found at these early sites, and in particular the question of whether the earliest toolmakers who occupied the region produced handaxes. As can be seen from table 10.2.1, two of the five sites identified in this study thought to pre-date 0.85 mya lack handaxes. These sites are also potentially older than the other three sites belonging to this period, which could be taken to suggest the earliest hominins occupying the Euphrates Valley did not produce handaxes. However, it will also be observed that these are both extremely small collections and, consequently, the lack of any associated handaxes could be a sampling issue. In addition, while the other three assemblages from the Euphrates datable to before 0.85 mya are larger and contain handaxes, it is notable that they are only found in small quantities. Furthermore, it will be recalled that the low frequency of handaxes in these assemblages is probably heavily influenced by the relatively small blanks available to hominins in this area (see chapter eight). There is no robust evidence to suggest that handaxes did not form part of the technological repertoire of the earliest hominins in the Euphrates Valley. Furthermore, it is clear that by 0.85 mya (at the very latest) they *were* producing handaxes, but that the frequency with which they were manufactured remained relatively low, due at least in part to local material constraints.

Interestingly, this situation has parallels at 'Ubeidiya, which is currently the earliest accepted Lower Palaeolithic site in the Near East. Here, most major archaeological layers only produced a few handaxes, whilst some lack them altogether (Bar-Yosef and Goren-Inbar 1993, 146). In contrast, however, one particular level (K30/K30 VB) produced handaxes in abundance (Bar-Yosef and Goren-Inbar 1993, 146). Furthermore, although there is clear evidence for *in-situ* artefact production at 'Ubeidiya in the form of material which conjoins (Bar-Yosef and Goren-Inbar 1993, 191), it is notable that all of the handaxes from level K30/K30 VB are abraded (Bar-Yosef and Goren-Inbar 1993, figure 69c), whilst the deposit from which they were recovered consisted of a fluvial conglomerate (Bar-Yosef and Goren-Inbar 1993, 122). Consequently, there is some indication that a large proportion of the handaxes excavated at 'Ubeidiya were brought into the site by natural processes and were therefore actually manufactured elsewhere. This suggestion is supported by the fact that whilst the vast majority of the handaxes from the site are on basalt blanks, basalt flakes were rarely encountered during the excavations (Bar-Yosef and Goren-Inbar 1993, 147). Although handaxes have been recovered in varying quantities from points throughout the artefact bearing sequence at 'Ubeidiya, it may not have been a locale at which handaxes were manufactured in large quantities.

Context	Assemblage size	Handaxes (%)	Other larger elements (%)
I-27	112	0.9	17.0
I-26 a	272	0.4	33.9
I-26 b1	208	1.4	35.1
I-26 b2	222	7.2	46.5
I-26 b/c	82	0.0	13.4
I-26 c	349	4.9	45.6
I-26 d	98	7.1	49.0
III-34	141	0.0	53.1
II-24	106	0.0	66.0
II-26	203	1.5	44.8
II-36	169	4.1	29.1
K-25	65	0.0	24.0
K-26	169	0.0	10.1
K-28	196	0.0	4.6
K-29	345	4.3	67.6
K-29 VB	194	0.5	32.5
K-30	295	42.0	44.5
K-30 VB	90	22.2	30.0

Table 10.2.2 Relative proportions of handaxes and other larger elements identified amongst the lithic assemblages from 'Ubeidiya (minimum sample size = 65; data from Bar-Yosef and Goren-Inbar 1993, table 17)

Although handaxes are not always present in large numbers in the assemblages from 'Ubeidiya, they did, in fact, form part of the technological repertoire associated with earliest evidence of hominin occupation in the region. Their presence at 'Ubeidiya is particularly significant as they are some of the earliest examples anywhere in the world. Furthermore, as the assemblage is currently thought to date to ~1.4 mya (see above), it is broadly contemporary with the earliest appearance of such artefacts at sites in East and Southern Africa. These include Olduvai Gorge Bed II (Leakey 1971), KGA-4 in Konso Gardula (Asfaw *et al.* 1992), Kokiselei 4 in West Turkana (Roche *et al.* 2003) and BSN-12, OGS-5 and OGS-12 in Gona (Quade *et al.* 2004), all located in the East African Rift Valley and Sterkfontein (Kuman 1994, Kuman and Clark 2000) in South Africa, and are broadly thought to date to between ~1.7 mya and ~1.5 mya. Notably, the co-incident appearance of handaxes over this wide geographical area may support the suggestion that the Near East then formed part of a wider interconnected geographic entity.

This, however, leaves us with the question of how to interpret the early Lower Palaeolithic artefact assemblages from 'Ubeidiya that lack handaxes. Are they, like those from the Euphrates, explicable in terms of sampling bias and local raw material factors? Significantly, it has been suggested that the lack of handaxes amongst some of the archaeological collections from 'Ubeidiya reflects the presence of different hominin groups, associated with different technological traditions (Bar-Yosef 1994, 237; 1998, 242). However, there are a number of problems with this suggestion. Firstly, handaxes are rarely totally absent from the artefact assemblages from 'Ubeidiya and are found *throughout* the 'Ubeidiya archaeological sequence. In fact, of the eighteen artefact collections containing more than 65 pieces published by Bar Yosef and Goren-Inbar (1993), twelve contain handaxes, although mostly in relatively small numbers (see table 10.2.2). Consequently aside from the large, seemingly derived, collection of handaxes from level K 30/K 30 VB, the artefact assemblages from 'Ubeidiya follow a continuum of variability, comprising collections in which handaxes do occur, but in relatively small numbers.

It is also notable that the six assemblages from 'Ubeidiya that lack handaxes, frequently display proportionally fewer other larger objects (those described as choppers, polyhedrons, discoids, spheroids and heavy duty scrapers), whilst none contain more than 200 artefacts (see table 10.2.2). Taken together these attributes suggests that, rather than being indicative of the presence of different hominin groups, the lack of handaxes in certain assemblages from 'Ubeidiya may in fact be a product of fluvial sorting, raw material issues relating to specific contexts, and/or differential use of space by hominins.

These issues relating to presence/absence of handaxes are relevant to wider debates concerning the artefactual evidence of the earliest hominins outside of Africa. Over recent decades, it has become an increasingly common practice to identify different early Lower Palaeolithic hominin groups and/or early hominin dispersal events, on the basis of artefact assemblages (e.g. Bar-Yosef 1994; 1998, Goren-Inbar and Saragusti 1996, Foley and Lahr 1997, Carbonell *et al.* 1999, Saragusti and Goren-Inbar 2001, Carbonell and Roderíguez 2006, Lycett and Von Cramon-Taubadel 2008). Much of this has revolved around the suggestion that it is possible to divide earlier Palaeolithic tool assemblages on the basis of the presence or absence of handaxes, those characterized by cores and flakes being referred to as "Mode 1" assemblages, and those with handaxes being "Mode 2" assemblages (Clark 1977, Toth and Schick 1993, Lahr and Foley 1994, Foley and Lahr 1997). However, although this argument is intuitively attractive, it suffers from a number of fundamental flaws when applied pan-globally.

One problem relates to the long standing archaeological problem of how to provide evidence of absence. As the Euphrates and 'Ubeidiya evidence demonstrates, handaxes can frequently form only a small proportion of these early Lower Palaeolithic assemblages, and that a sizeable artefact sample is required before it is possible to make a robust argument for an absence of handaxes from a particular site. Furthermore, as Villa (2001, 119) has pointed out, the difficulties in distinguishing between so-called Mode 1 and Mode 2 assemblages is heightened by the fact that, handaxes aside, there are no other technological distinctions between the two groups of assemblages (see also McNabb 2007 for a detailed discussion of these issues specifically in reference to non-handaxe industries in Britain and northern continental Europe). As this current study has demonstrated, although the core forms and flakes recovered from Lower Palaeolithic sites vary, frequently in response to local contingencies, core working practices are essentially identical. Regardless of whether or not handaxes are present in assemblages, flaking seems to be geared to the removal of the largest possible flake blanks from the particular nodules which were available to the knapper through the *ad hoc* exploitation of core platforms, until a point was reached at which at least moderate sized flakes could no longer be produced (see chapters five and eight).

A further fundamental methodological flaw with the "Modes" concept lies in the fact that an assemblage can shift between groupings simply through the addition of single index fossil (i.e. the presence of a single handaxe means that an assemblage is classed as a Mode 2 assemblage). At the same time, the system masks genuine variability between Lower Palaeolithic assemblages, such as has been documented in this study for different handaxe assemblages from the Orontes Valley (see chapter five). Furthermore, the association between these definitions and different hominin groups overlooks the myriad of alternative explanations for the absence of handaxes in Lower Palaeolithic assemblages, such as sampling factors, occupation lengths, taphonomic issues and potential spatial variation in hominin behaviour within and between sites, what Rolland (1998, 200) terms the internal elasticity of Lower Palaeolithic technological repertoires.

Perhaps most fundamentally of all, however, the use of such overarching concepts hampers interpretation of Lower Palaeolithic behavioural variability by obscuring specific situational factors which may account for the composition of artefact assemblages. Take, for example, the site of Rastan in the Orontes Valley. As this study has demonstrated, handaxes are probably absent from this assemblage because at, and upstream of, the site the only available raw material consisted of small river pebbles, which would not have allowed for the frequent production of handaxes (see chapter five, section 5.3). Consequently, this is not necessarily the work of hominins who lacked the ability to produce handaxes; rather, it is the product of hominins actively reacting to specific situational factors. It is therefore clear that, as Villa (2001, 117) has stated, the division between Mode 1 and 2 technologies based on index fossils results in arbitrary, simplistic generalizations that ignore the variability and historical contingencies documented in the archaeological recorded. Furthermore, it is only through the consideration of factors specific to individual artefact assemblages that the absence of handaxes from individual collections can be explained, which may in turn result in the accumulation of enough data to provide robust evidence for regional and/or temporal patterning.

The situational nature of much early hominin behaviour does, however, lead one to question whether it is ever possible to draw legitimate cultural and/or biological links between geographically separated groups of early Lower Palaeolithic hominins, on the basis of artefact assemblages. For instance, it has been suggested that similarities between the artefact assemblages from 'Ubeidiya and Upper Bed II at Olduvai Gorge provide direct evidence of a biotic link between the Near East and the East African Rift Valley (Bar-Yosef and Goren-Inbar 1993, 200). However, a number of factors suggest that this claim should be treated with caution. The 'Ubeidiya assemblage has actually been classified using the same techno-typological categories used to catalogue the Olduvai material (Bar-Yosef and Goren-Inbar 1993, 71). Consequently, it is perhaps unsurprising that the two assemblages share similarities, as the forms of the 'Ubeidiya artefacts have been fitted into this pre-existing classificatory scheme. Furthermore, both the Olduvai Upper Bed II and 'Ubeidiya assemblages largely consist of simple cores and flakes (Leakey 1971, Bar-Yosef and Goren-Inbar 1993) and could therefore be described as the product of a "baseline" technology, the simplicity of which leaves little scope for variation, and at the same time makes a degree of similarity almost inevitable. It is, therefore, difficult to substantiate the claim that similarities between the two assemblages provide evidence of direct biotic contact.

The claimed African affinities of artefact assemblages from the site of Jisr Banat Yaqub (Gesher Benot Ya'aqov) are similarly noteworthy. This site, located on banks of the River Jordan in the Dead Sea Rift Valley, was discovered in the early 1930s (Stekelis *et al.* 1937; 1938, Stekelis 1960) and was from the first regarded as distinct from other earlier Palaeolithic assemblages in the region (Stekelis 1960, 86). However, it was only following recent excavations carried out in the late 1980s and mid-1990s that it was suggested that these distinctive features were suggestive of an African influence (e.g. Goren-Inbar 1992, Goren-Inbar and Saragusti 1996, Saragusti and Goren-Inbar 2001).

The deposits at Jisr Banat Yaqub consist of lacustrine sediments overlain by fluvial conglomerates towards the top of the sequence (Feibel *et al.* 1998). This contains numerous archaeological layers and is thought to have been deposited around the Brunhes-Matuyama paleomagnetic boundary i.e. 0.78 mya (Versosub *et al.* 1998, Goren-Inbar *et al.* 2000, Rink and Schwarz 2005). The site has produced a large number of handaxes and cleavers, most notably from an expanse of artefacts from Layer II-6, level 1 and a densely packed concentration of lithic material from Layer II-6, level 4 (Goren-Inbar *et al.* 1992; 2000, Goren-Inbar and Saragusti 1996, Madsen and Goren-Inbar 2004). These assemblages contain handaxes and cleavers which display attributes that set them apart from other Near Eastern handaxe assemblages. Most are on basalt, which is particularly notable as, apart from 'Ubeidiya, Jisr Banat Yaqub, is the only Lower Palaeolithic site in the region at which this material is commonly exploited. Furthermore, uniquely amongst Near Eastern assemblages, they are usually on large flake blanks, many of which were produced using what is termed the Kombewa technique (Saragusti and Goren-Inbar 2001, 87, Sharon 2007, 68). This involves the production of large flakes, which are then utilised as cores and other flakes removed from their ventral surfaces, thus producing a Kombewa flake (i.e. a flake which possesses two ventral surfaces; Owen 1938, Newcomer and Hivernal-Guerre 1974, 123-124, Sharon 2007, 44-48).

Interestingly, although the Jisr Banat Yaqub handaxe and cleaver assemblages stand out amongst Near Eastern collections, they do have parallels in East and North Africa. Here, the exploitation of large flake-blanks to produce handaxes is common (Isaac 1977, 177), with large collections recorded from sites such as Bed IV and the Masek Beds in Olduvai Gorge (Callow 1994, Jones 1994, Roe 1994), Olorgesailie (Isaac 1977, Potts 1989; 1994; Potts *et al.* 1999), Isimila (Howell 1961, Howell *et al.* 1962, Kleindeinst 1962), Isenya (Roche et al. 1988, Roche and Texier 1991; 1995) and Tighenif (Ternifine) (Geraads *et al.* 1986). In addition, the use of the Kombewa technique to produce flake blanks is also recorded at several of these sites. Consequently, these similarities have been used to suggest that the handaxe and cleaver assemblages from Jisr Banat Yaqub have distinctive African affinities, indicative of the transfer of ideas and/or populations between Africa and the Near East, which are manifested through distinct traditions of stone tool production (Goren-Inbar and Saragusti 1996, Goren-Inbar *et al.* 2000, Saragusti and Goren-Inbar 2001).

However, although taken on face value this is a quite an attractive argument, it suffers from a significant drawback. The raw material used to produce the handaxes and cleavers from Jisr Banat Yaqub was obtained from large basalt boulders or primary flow outcrops found in the immediate vicinity of the site (Goren-Inbar and Saragusti 1996, 26). Consequently, it is arguable that the *only* way in which handaxe blanks could be obtained from sources such as these was by producing flake blanks, which themselves would have often been large, requiring flaking again to produce a workable handaxe blank, that would have been in the form of a Kombewa flake. In contrast, other large handaxe assemblages from the Near East, including those from 'Ubeidiya (Bar-Yosef and Goren-Inbar 1993, 121) and Latamne (see chapter five, section 5.4), tend to be produced on medium-sized basalt or chert/flint nodules.

Ultimately, therefore, what underlies Jisr Banat Yaqub's uniqueness, in terms of Lower Palaeolithic assemblages from the Near East, is the fact that hominins were exploiting unusually large raw material blanks. Furthermore, the common features shared by the handaxe and cleavers from the site with those found in African collections (e.g. Olduvai, Olorgesailie, Isimila, Isenya and Tighenif) can be attributed to the exploitation of similar, large material at these locales (Howell et al. 1962, Isaac 1977, Callow 1994, Jones 1994, Texier and Roche 1995, Sharon 2007; 2008). Therefore, rather than implying a direct cultural connection between the two regions, these similarities result from producing the same type of artefacts on similar large blanks, the nature of which required a broadly analogous approach to working. As such, both the 'Ubeidiya and Jisr Banat Yaqub examples reflect the problems inherent in attempting to make cultural and/or biological links between geographically distinct groups of Lower Palaeolithic hominins, based on superficial similarities in artefact assemblages.

In conclusion, the identification of five artefact-bearing localities in the middle Euphrates Valley dateable to at least ~0.85 mya adds significantly to the meagre collection of early Lower Palaeolithic sites in the Near East, and at the same time contributes to the emerging picture of the pan-Eurasian spread of early hominins outside of Africa. Furthermore, the recognition of these sites adds some credence to the suggestion that, rather than seeing the Near East as conduit for early human migrations, the region should be viewed as part of a single environmental unit extending through eastern African and western Asia, referred to as "Savannahstan" (Dennell and Roebroeks 2005), and which may have seen a permanent hominin presence from at least ~1.00 mya, if not earlier. The presence of hominins at this early date in the Euphrates Valley reinforces the growing realisation that the Arabian Peninsula may have been of central importance to early hominin expansions out of Africa, with the Euphrates Valley potentially forming an important route linking Arabia and East Africa to the Levant, Anatolia, the Caucasus and, eventually, Europe.

Whilst much previous research has focussed on using stone tools associated with the earliest sites in the Near East to draw overarching phyologenetic links between widely dispersed hominin groups, it is clear that not only are these difficult to substantiate, but arguably, they also inhibit attempts to consider aspects of early hominin behaviour, subsistence practices and landscape-use. The evidence from the Euphrates Valley sites and 'Ubeidiya demonstrates that in order to answer such questions by analysing Lower Palaeolithic stone tools, it is necessary to consider how situationally specific factors and local affordances may have impacted on assemblage-level variability. Not only does this allow meaningful insights into early hominin behavioural practices to be gained, but it allows us to move away from simplistic, sweeping generalisations about hominin tool making practices which neglect the data and ignore the analytical details.

10.3 Lower Palaeolithic technological variability; the Orontes and Euphrates evidence in its regional context

Earlier Palaeolithic material culture is almost exclusively dominated by stone tools. Consequently, it is unsurprising that great significance has always been attached to variations between Lower Palaeolithic lithic assemblages. In particular, researchers in Africa and western Eurasia have, and still do, place great emphasis on the typo-technological variability exhibited by Lower Palaeolithic handaxes (e.g. Bordes 1961, Roe 1964; 1968, Wymer 1968, Gilead 1970, Hours 1975; 1981, Rollefson 1978, Callow 1986, Wynn and Tierson 1990, Crompton and Gowlett 1993, Ashton and McNabb 1994, Gowlett and Crompton 1994, White 1998, McPherron 1999; 2003; 2006, Ashton and White 2003, Boëda *et al.* 2004). This issue has traditionally been central to research in the Near East, forming the basis of the standard techno-typological divisions used to categorize earlier Palaeolithic artefact accumulations, which in turn underlie most discussions relating to Lower Palaeolithic artefact variability.

In Syria, Lebanon and eastern Turkey assessments of Lower Palaeolithic artefact variability have been dominated by lithic typologies and a chrono-cultural sequence developed from the 1970s onwards by Francis Hours, Lorraine Copeland and Sultan Muhesen (e.g. Hours 1975; 1981; 1992, Copeland and Hours 1979; 1993, Muhesen 1981; 1985; 1993, Copeland 2004). These researchers were responsible for the recovery of large quantities of Palaeolithic artefacts from this region, including the majority of those analysed in this study (see chapters four and seven). Using this material, which they accumulated over several decades of research, these authors devised a means of documenting changes in artefact form (in particular, handaxes) using typo-technological classifications imported from European and African studies. As these differences were believed to have chronological significance, a standard evolutionary sequence for Lower Palaeolithic stone tool collections was developed which, although modified over time, is still in use today (e.g. Boëda *et al.* 2004, Copeland 2004, Le Tensorer 2006, Le Tensorer *et al.* 2007).

The classificatory system devised by these researchers consisted of four chronologically distinct entities, the earliest of which comprised a number of small, ill-defined artefact collections variously referred to as Para-Acheulean, or Early Acheulean (Hours 1975, 254; 1981, 167). These included the small collection of cores and flakes from Borj Qinnarit (see section 10.2), considered to be of notable antiquity due to the stratigraphic position from which they came. Such collections are considered to predate assemblages referred to as Middle Acheulean; which are characterized by the presence of relatively unrefined hard hammer handaxes, and can also include three-edged trihedrals (Hours 1975, 254; 1981, 168, Copeland and Hours 1993, 75-91, Copeland 2004, 33-35). Within the Middle Acheulean, two geographically and culturally distinct 'facies' have been identified (Hours 1981, 168-169, Copeland and Hours 1993, 90, Copeland 2004, 53). The first is concentrated along the Syrian and Lebanese coast (particularly at sites in the valley of the Nahr el-Kebir in north-western Syria) and is characterized by handaxe assemblages dominated by ovate and amydaloidal forms. In contrast, the second grouping consists of assemblages dominated by more pointed handaxes, which frequently include three edged trihedrals, and is found at sites located mainly along inland river valleys (including the Orontes and Euphrates).

The third major grouping within this chrono-cultural sequence comprises a group of lithic assemblages described as Late or Upper Acheulean. These are differentiated from Middle Acheulean assemblages because they contain ovate and amygdaloidal handaxes that are more regular in planform, and which often display evidence of secondary soft hammer thinning (Hours 1981, 173, Muhesen 1981, 185, Copeland and Hours 1993, 99-103, Copeland 2004, 41-42). Furthermore, the Late Acheulean is argued to be associated with "evolved" methods of core reduction, which in some instances includes limited evidence of Levallois flaking (Hours 1981, 173, Muhesen 1981, 185, Copeland and Hours 1993, 94, Copeland 2004, 54). Like the Middle Acheulean, the Late Acheulean is argued to contain several regionally and culturally distinct sub-groups (Muhesen 1981, Copeland 2004, 54) one of which includes the artefacts from Ain Abu Jemaa, Ain Tabous and Hamadine on the middle Euphrates (see chapter eight, sections 8.3 and 8.4). These assemblages are seen as distinct from "typical" Late Acheulean assemblages as they contain handaxes which, although broadly conforming to the planform used to characterise the Late Acheulean (Copeland 2004, 40), also tend to be elongated, and lack evidence of soft hammer thinning (Copeland 2004, 54).

The final Lower Palaeolithic techno-typological grouping recognized in this classificatory sequence comprises a small number of assemblages categorized as belonging to the "Late Evolved" or "Upper Evolved" Acheulean (Hours 1981, 173, Muhesen 1981; 1985, Copeland and Hours 1993, 103-106, Copeland 2004, 55). This grouping is considered to be a terminal variant of the Late Acheulean, largely on typological grounds (Hours 1981, 173, Muhesen 1985; 1993, Copeland and Hours 1993, 105, Copeland 2004, 55). Defined largely on the basis of the assemblage from Gharmachi 1b in the Orontes Valley (see chapter five, section 5.5), it is argued to contain small amydaloidal, ovate and cordiform handaxes which are considered to be more "evolved" than those from other Final Acheulean collections, as they are more refined, with finer flaking and straighter edges (Muhesen 1985, 29). Furthermore, increased evidence of more "evolved" approaches to core working involving greater platform preparation is argued to be present amongst Final Evolved Acheulean assemblages (Muhesen 1985, 29, Copeland and Hours 1993, 94, Copeland 2004, 55), and some collections assigned to this grouping are suggested to contain a notable proportion of Levallois pieces (Muhesen 1985).

The general adoption of this four-phased division of the earlier Palaeolithic in the northern Levant has had a significant impact on how artefact variability is interpreted in the region, as it asserts that typological and technological differences observable in Lower Palaeolithic assemblages from Syria, Lebanon and south eastern Turkey are chronologically significant. Furthermore, under this scheme variability between broadly contemporary assemblages is often considered to reflect cultural differences (Le Tensorer 2006, Boëda *et al.* 2004, Copeland 2004, 53), which some scholars believe enable the identification of regionally and temporally specific cultural provinces (Boëda *et al.* 2004, Copeland 2004, 53). This study challenges these assertions.

Analysis of key Lower Palaeolithic assemblages from both the Orontes and Euphrates Valleys suggests that, contrary to past interpretations (e.g. Muhesen 1985; 1993, Copeland and Hours 1993, Copeland 2004), assemblages previously assigned to the Middle, Late and Late Evolved Acheulean display broadly analogous technological attributes. As can be seen from table 10.3.1, all consist of non-Levallois cores, unmodified flakes and a very small number of *ad hoc* retouched tools. Furthermore, although absent in a few rare instances, most contain handaxes (see chapter eight, section 8.2 for discussion of the inferences that can potentially be drawn from the absence of handaxes from the assemblages from Maadan 1, Maadan 5 and Rastan). Significantly, no classic Levallois cores were identified in the collections studied. However, at two sites (Ain Abu Jemaa and Jrabiyat 2) a small number of simple prepared cores were identified. These cores possess all the features of Boëda's (1986,

1995) volumetric definition of Levallois flaking (see chapter three), but lack evidence for deliberate surface configuration. The presence of such cores amongst material from these two sites, which are widely separated both geographically and temporally (see table 10.3.1), is notable, as it demonstrates that the sporadic appearance of "Levallois" cores at Lower Palaeolithic sites in the Near East cannot be taken to be an indicator of relative age.

Site	River Valley	Preferred date	Previous typo-techno. attribution	No. of Non-Lev. cores	No. of simple prep. cores	No. of Lev. Cores	No. of h/axes	No. flakes /flake tools
Maadan 1	Euphrates	?>1.20 Ma	Middle Acheulean	25	0	0	0	44/0
Maadan 5	Euphrates	?>1.20 Ma	Middle Acheulean	1	0	0	0	5/0
Ain Abu Jemaa	Euphrates	1.20-0.85 Ma	Late Acheulean	81	3	0	10	260/1
Ain Tabous	Euphrates	1.20-0.85 Ma	Late Acheulean	55	0	0	7	156/2
Hamadine	Euphrates	1.20-0.85 Ma	Late Acheulean	61	0	0	14	249/1
Hammam Kebir II	Euphrates	<1.20->0.37 Ma	Late Acheulean	19	0	0	18	55/0
Halouanndji IV	Sajour	<1.20->0.37 Ma	Late Acheulean	27	0	0	4	118/2
Rastan	Orontes	<0.66->0.37 Ma	?Middle Acheulean	56	0	0	0	76/0
Latamne 'Living Floor'	Orontes	0.43-0.37 Ma	Middle Acheulean	112	0	0	50	908/26
Gharmachi 1	Orontes	?0.43-0.37 Ma	Middle/ Late Evolved	288	0	0	71	758/12
Jrabiyat 2	Orontes	?0.30-0.24 Ma	Late Acheulean	21	1	0	14	20/0
Jrabiyat 3	Orontes	?0.30-0.24 Ma	Late Acheulean	20	0	0	10	40/0
Jrabiyat 4	Orontes	?0.30-0.24 Ma	Late Acheulean	33	0	0	20	72/0

Table 10.3.1 Composition of lithic assemblages studied from Lower Palaeolithic sites in the Euphrates and Orontes Valleys (previous techno-typological attributions taken from Copeland and Hours 1993 and Copeland 2004 – note that those given for Gharmachi 1 combine those given for the 'Gharmachi 1a' and 'Gharmachi 1b' assemblages; see chapter 5 section 5.5).

In addition, rather than detecting any "evolution" over time in the core working practices during the Lower Palaeolithic of the Orontes and Euphrates Valleys (Muhesen 1985; 1993, Copeland and Hours 1993, Copeland 2004), this study has demonstrated a remarkably consistent picture of core reduction regardless of the typo-technological attributions previously ascribed to particular collections (see chapters five and eight). All the Lower Palaeolithic assemblages considered are characterized by the production of medium-sized flakes through the *ad hoc* exploitation of platforms as they emerged throughout reduction. It is furthermore apparent that any slight variations in core working practices can be attributed to specific local issues concerning the size and/or form of the original blanks exploited. For instance, the cores from Rastan in the Orontes Valley have been subject to only a few, short episodes of flaking, as they are on particularly small blanks which limited the number of medium-sized flakes that could be detached (see chapter five, section 5.3). Conversely, minor differences between the core working practices evident in the assemblages from the Latamne "Living floor" site and Gharmachi 1 can be accounted for by the differences in the flaking opportunities provided by available blanks. Tabular blanks were sometimes exploited by the Latamne knappers, whilst at Gharmachi 1, nodules were almost exclusively utilised in core working (see chapter five, sections 5.4 and 5.5), Furthermore, like Rastan, cores from sites in the Euphrates Valley display a restricted number of flake removals, but in these particular cases, both the size and the shape of the nodules (medium-sized rounded river cobbles) limited the number of medium-sized flakes which could be detached from a particular blank (see chapter eight).

In short, it is clear that the core working practices associated with all of the Lower Palaeolithic sites studied here, regardless of previous typo-technological attributions, form part of simple and consistent approach to flaking; any minor differences in the nature and intensity of reduction are attributable to particular local affordances. Consequently, this research does not support the suggestion that chronologically or culturally significant changes in core working practices are evident within the Lower Palaeolithic record of the Orontes and Euphrates Valleys. Furthermore, although study of the handaxes from these sites has demonstrated technological and typological variability exists between these assemblages, it has also shown that this does not seem to be related to chronological factors, nor to simplistic cultural divisions.

The suggestion that other factors can account for Lower Palaeolithic handaxe variability in the Orontes and Euphrates Valleys, is most clearly illustrated by the handaxe assemblages from the Latamne "Living Floor" site and from Gharmachi 1. Previously, these two assemblages were seen to represent two culturally and chronologically distinct collections, mostly on the basis of the form and technological attributes of the handaxes from the sites (Muhesen 1985; 1993, Copeland and Hours 1993). However, this study indicates that these assemblages are in fact much closer in age than previously suggested (in fact it is possible that they are broadly contemporary; see chapter five, section 5.5), and that the typo-technological variability apparent between the two assemblages is explicable in terms of local factors and active hominin technological choices (see chapter five, sections 5.4 and 5.5).

It has been shown the Latamne handaxe assemblage is dominated by unrefined, pointed forms because most have been worked using only a hard hammer. In contrast, the Gharmachi 1 handaxes are more refined and broad in planform, a feature which results from extensive soft hammer thinning. Notably, the presence of a small number of handaxes from Latamne that do reflect the use of a soft percussor suggests that their extensive use at Gharmachi 1 is unlikely to be an indicator of cultural affinities. In fact, it seems that the form of the nodules exploited at Latamne was responsible for the general lack of soft hammer thinning and for the approach taken to reduction.

Most handaxes from Latamne are on tabular blocks, the form of which arguably required reduction to be initiated using a hard hammer, biting into the volume of the selected block, and resulting in the production of elongated, pointed, (and occasionally trihedral) handaxes. Thus shaped, such handaxes did not permit extensive soft hammer thinning by striking through their edges and removing material from an upper, curving surface; rather, the steep angles offered could only be exploited further by cutting into the already-shaped volume of the piece. Moreover, blanks that had been worked in this manner did not possess a sufficient volume to allow their edge to be "turned" (*cf.* Whitaker 1994) to permit soft hammer flaking. Peripheral soft hammer trimming of the edge itself would be possible – and was occasionally applied at Latamne – but it was rarely possible to thin the *volume* of whole handaxes. Thus, the characteristics of the available nodules acted to direct the initial course of reduction, with a concomitant impact upon the reductive paths which evolved "in hand" as the knappers engaged with the material. In contrast, the Gharmachi 1 handaxes are on rounded river cobbles, the shapes of which were more readily compatible with the production of handaxes which could be extensively thinned. Consequently, it would seem that rather than being chronologically or culturally significant, the techno-typological differences exhibited by Lower Palaeolithic handaxes in this region are a product of both particular local affordances and active technological choices made at the beginning of, and throughout, reduction - a suggestion which is not only supported by the Latamne and Gharmachi 1 evidence, but by all the Lower Palaeolithic handaxe assemblages studied from both the Orontes and the Euphrates (see chapters five and eight).

Importantly, this research casts doubt not only on the suggestion that Lower Palaeolithic lithic variability in Syria has chronological or cultural significance, but also challenges the validity of the terminological sub-divisions currently used to differentiate collections. It seems clear that such nomenclature not only fails to represent any real chronological, cultural or technological boundaries, but it arguably also hinders interpretations of real variation in Lower Palaeolithic artefacts. By ignoring these divisions and assessing each individual collection on its own merits, this research has demonstrated it is possible to assess some of the underlying causes of such variability. It is therefore clear that although Lower Palaeolithic hominins in the Orontes and Euphrates Valleys produced artefacts using a similar and consistent technological repertoire, differences in the products that they produced are apparent which, at least in part, reflect specific local affordances and specific technological choices.

A brief consideration of other Lower Palaeolithic sites in Syria demonstrates the potential interpretative benefits which could be gained through applying more broadly this technological, assemblage-specific approach. One example is the site of Nadaouiyeh Aïn Askar, located on the northern slope of El Kown basin ~90 km north-northeast of Palmyra in central Syria. Since the late 1970s, this important site has produced a number of earlier Palaeolithic artefact collections (Cauvin *et al.* 1979, Hours *et al.* 1983, Le Tensorer *et al.* 1993, Jagher *et al.* 1997, Jagher 2004, Jagher 2005, Le Tensorer *et al.* 2007), and a sizeable faunal assemblage (Reynaud Saviouz 2005, Reynaud Saviouz and Morel 2005), as well as an almost complete human left parietal bone (assigned to *Homo erectus*) (Jagher *et al.* 1997). The deposits excavated at the site consist of material of aeolian and lacustrine origin found infilling a doline (Reynaud Saviouz and Morel 2005, 32, Le Tensorer *et al.* 2007, 625) which formed part of an extensive karstic system. The doline was filled by a spring fed pond, human occupation tending to occur during periods in which water levels were relatively low (Pümpin 2003, quoted in Le Tensorer *et al.* 2007, 627).

Despite stratigraphic difficulties resulting from complex site formation processes, (Jagher *et al.* 1997, 88, Le Tensorer *et al.* 2007, 627), *in-situ* handaxe assemblages from the site can be re-attributed to stratigraphic position. Significantly, the handaxe assemblages reflect changing handaxe variability over time; highly refined ovate handaxes present in the earlier levels are replaced by *less* elaborate, smaller and more irregular examples further up the sequence (Jagher *et al.* 1997, 88, Le Tensorer 2006, 129, Le Tensorer *et al.* 2007, 625). However, absolute dates for the sequence have not yet been published. This pattern directly contradicts the assumed progressivism which underwrites traditional earlier Palaeolithic cultural evolutionary sequences from the region (see above), and further illustrates the dangers inherent in using handaxe form and level of refinement as a temporal indicator.

Le Tensorer (2006) has recently postulated that the temporal variability evident at Nadaouiyeh could be linked to the changing role which the handaxe played in creating and sustaining cultural links within Middle Pleistocene hominin societies. He argues that consistent levels of form, refinement and symmetry exhibited by handaxes from the oldest deposits from Nadaouiyeh can be seen to be the product of defined cultural criteria which may have acted as a symbolic construct that was central to hominin social cohesion (Le Tensorer 2006, 31). On this basis he suggests that changes from refined to irregular handaxes through time may be linked to the "désacralisation" of the handaxe as a cultural entity, with symbolic expression being increasingly expressed through other media such as word, gesture and ritual (Le Tensorer 2006, 33).

Elegant though this suggestion is, it should be noted that the available drawings of the Nadaouiyeh handaxes (Le Tensorer *et al.* 1993, 29-33, fig. 6-11, Jagher *et al.* 1997, 90, fig. 3, Jagher 2004, 39, fig. 30) consistently illustrate the fact that handaxes from the upper levels at the site tend to be small and retain high amounts of cortex which define the form of the original blank exploited, whilst those from the lower levels tend to be larger and completely decorticated. This actually suggests that the form of blanks exploited differed between the two groups of handaxes, with those from the upper units frequently being produced on small cobbles which may have placed restrictions on the options available to the knapper. Thus the differences evident in the form of the handaxes found at Nadaouiyeh could to some degree be related to differences in the raw material sources exploited (this distinction could relate to the use of high quality bedrock chert/flint in the lower levels and nodules derived from wadi gravels in the upper units, both of which would have been available in the El-Kowm basin; see Diethelm 2004). This is not to say that other factors may not have had any influence on the form of the finished handaxes from Nadaouiyeh, but rather, it illustrates that any discussion of artefact variability from a site must take into account the specific context of the material.

If one disregards the cultural interpretation of the temporal change apparent at Nadaouiyeh advanced by the excavators, and adopts a contextualised, technological consideration of the published data, it is possible to examine what factors may have interacted to influence the form of the artefacts, and composition of the assemblage, that hominins were discarding around the doline. For example, Level 8 is found towards the base of the sequence and contains at least two separate horizons which have produced relatively undisturbed artefact accumulations (Jagher 2004, 37-38). These consist of highly refined ovate handaxes, along with a flake assemblage, but very few cores (Jagher *et al.* 1997, 89). The source of the raw material utilized to make the handaxes from Level 8 at Nadaouiyeh is unknown (Diethelm 2004), but there is no evidence that a source of raw material was immediately available. Notably, the handaxes recovered from these deposits tend to display tranchet removals, (oblique soft-hammer blows along one edge, usually near the tip, which serve to resharpen it), and tranchet flakes are also found amongst the associated flake assemblage (Jagher *et al.* 1997, 89, Jagher 2004, 34). In addition, cutmarked ungulate bones were obtained from the same level (Jagher *et al.* 1997, 89). Taken together, these factors suggest that this particular assemblage is the product of hominins bringing handaxes produced elsewhere in the landscape into the area surrounding the spring fed pond found within the Nadaouiyeh doline. These then appear to have been used and re-sharpened in order to process ungulate carcases, before (at least in some cases) being discarded at the locale. It is not clear how the carcases were obtained.

Although specific distances and timescales are difficult to assess, it seems clear that the handaxes from Level 8 at Nadaouiyeh were curated and that they are a product of very specific technological and landuse practices. Consequently, any assessment of the influences which lay behind the form displayed by these handaxes must take these issues into account. One factor which has almost certainly exerted an influence on the form and refinement of the handaxes from Level 8 at Nadaouiyeh is the fact that many have been re-sharpened by tranchet removals, which tend to remove the tip of a handaxe (progressively rendering them rounder, and less pointed; *cf.* White 2006) and are intimately linked with extensive soft hammer thinning.

It is important to recognize that the fact that these handaxes appear to be curated artefacts, also suggests that they are *selected* artefacts. This implies that the form and refinement which they display is reflective of specific choices made by the individuals who produced them, which relate to their "suitability" as retained tools (the specific factors which directed these choice, be they utilitarian and/or cultural, are difficult to assess, particularly as they may also be influenced by restrictive factors such as the nature of the available raw material and the skill of the individual knapper). Consequently, it is clear that the form of handaxes from Level 8 at Nadaouiyeh reflects the technological choices made by hominins which relate to particular behavioural practices. As with the sites considered in this thesis, the Nadaouyieh material again demonstrates that by considering the context of earlier Palaeolithic assemblages it is possible to gain greater insights into the factors that structure

Lower Palaeolithic artefact variability, as well as a more dynamic understanding of early hominin lifeways.

The approach adopted here to the interrogation of Lower Palaeolithic artefact variability has a potential impact that extends beyond Syria to the wider region. For instance, in Palestine/Israel, studies of earlier Palaeolithic artefact variability have traditionally been underpinned by an adherence to a chronostratigraphic sequence based on typo-technological changes in artefact form (particularly handaxes), believed to have chronological or "evolutionary" significance. The divisions used in this area follow those originally devised by Gilead (1970), and subsequently modified by Ronen (1979) and Bar Yosef (1994; 1998). However, unlike the Syrian framework, the Late/Upper Acheulean in this region is subdived into four groups (the number of groups varies between author), whilst collections have been assigned to the Middle and Upper/Late Acheulean following broadly analogous criteria (i.e. on the basis of artefact, in particular handaxe, morphology; differences in handaxe form also underlie divisions within the Late Acheulean). However, as in the northern Levant, evidence is beginning to emerge which challenges this thinking.

Significantly, most sites from Palestine/Israel that have been described as "Upper/Late Acheulean" are unstratified - e.g. El Hamari (Ma'ayan Barukh) (Stekelis and Gilead 1966, Ronen *et al.* 1980), Kissufim (Ronen *et al.* 1972), and findpots on the Baram and Yiron Plateaus (Ronen *et al.* 1974, Ohel 1979; 1986; 1990) - or are associated with deposits which, at present, lack chronological resolution e g. Revadim (Marder *et al.* 1998, Gvirtzman *et al.* 1999, Marder *et al.* 2006), Oumm Zinat (Gilead and Ronen 1977, Horwitz and Tchernov 1989) and Emeq Refaim (Arensburg and Bar Yosef 1963). Furthermore, when sites have been dated they frequently fail to conform to assumed chronological patterning. This is clearly illustrated by recent radiometric dates provided for the archaeology from Holon and El Hamari.

Excavation work carried out in the mid 1960s and early 1970s at Holon, an urban area south of Tel Aviv (Yizraeli 1963; 1967, Noy and Issar 1971), produced a relatively undisturbed lithic assemblage consisting of flakes, cores and small, unrefined handaxes (Chazan 2007a; 2007b). On typo-technological grounds this assemblage has traditionally been ascribed to the Middle Acheulean (Ronen 1979, 299, Bar-Yosef 1994, 246; 1998, 255). However, recent Electron Spin Resonance (ESR) and luminescence dates (Porat *et al.* 1999, Porat 2007) have established that the artefacts are in fact associated with deposits laid down during MIS 7, making the assemblage, chronologically at least, early Middle Palaeolithic (see table 10.5.2 below). Similarly disconcerting dates have emerged for artefacts from El Hamari in upper

Galilee. The large collection of handaxes from this site (most of which are surface finds) has traditionally been ascribed as Late Acheulean on typological grounds (Copeland and Hours 1993, 103, Bar-Yosef 1994, 249; 1998, 258). However, Thorium-230/Uranium-234 dating applied to travertine coating two handaxes from the site suggests an age close to the system equilibrium, indicating a date of MIS 13/12 for the material (Bar-Matthews pers. comm. quoted in Sharon 2007, 208). Consequently, this new date indicates that the artefacts from this site are broadly contemporary with the Latamne "Living Floor" assemblage (which is traditionally described as an archetypal Middle Acheulean accumulation - see above), and are not, therefore, ascribable to the late Lower Palaeolithic, as a Late Acheulean association would suggest.

It seems clear that, as in Syria, traditional chronostratigraphic sequences that rely on supposed evolutionary changes in artefact form fail to adequately identify or account for variability amongst Lower Palaeolithic artefact assemblages from Palestine/Israel. This is not to say that there is no variation in Lower Palaeolithic assemblages from this area, nor does it exclude the possibility that these may have temporal significance (although in order to demonstrate this a greater corpus of chronologically constrained Lower Palaeolithic sites is required than currently found in the region). It does, however, suggest that new approaches to the study of Lower Palaeolithic artefact variability are necessary which, like those applied to Syrian sites in this study, take a contextual approach to the analysis of artefact variability in order to illustrate the technological, behavioural and/or cultural decisions which potentially underlie such differences.

The applicability and interpretative potential of such an approach to the study of Lower Palaeolithic record of Palestine/Israel is demonstrated in a recent study by Goren-Inbar and Sharon (2006) of the artefacts from Area C at Jisr Banat Yaqub (see section 10.2). This assemblage differs from others recovered from the site in that it is characterised by an abundance of flint artefacts and a paucity of bifacial tools (Goren-Inbar and Sharon 2006, 111). Following traditional cultural evolutionary frameworks, this difference could be interpreted as reflecting the presence of two culturally distinct hominin groups operating at Jisr Banat Yaqub (much as was a similar pattern noted for the material from 'Ubeidiya; see section 10.2). However, Goren-Inbar and Sharon (2006) have convincingly demonstrated that in fact the flake assemblage from Area C contains a relatively high proportion of handaxe thinning flakes, and is in fact indicative of the latter stage of handaxe production (Goren-Inbar and Sharon 2006, 131). Furthermore, it is interesting to note that paleontological analysis suggests that one of the main activities in Area C was carcase processing (Rabinovich *et al.*, 2008), which taken with the archaeological evidence suggests that the associated artefact assemblage is a product of hominins bringing handaxes into the site, possibly in the form of roughouts (Goren-Inbar and Sharon 2006, 131), working them further for carcase processing, and subsequently removing them from the site. Therefore, rather than being indicative of chrono-cultural affinities, it seems that the assemblage from Area C at Gesher is in fact a product of similar technological decisions and patterns of landuse as can be reconstructed from the data from Level 8 at Nadaouiyeh Aïn Askar (see above).

In conclusion, this research has demonstrated the potential pitfalls of using artefact typo-technological classifications to date earlier Palaeolithic artefact accumulations and that simplistic chrono-cultural evolutionary sequences fail to accurately characterise Lower Palaeolithic artefact variability in the Near East. Furthermore, it has illustrated that an adherence to these practices has limited our ability to assess the factors which potentially underlie earlier Palaeolithic artefact variability. This is not to deny that chronological change in artefact form may be apparent, but such trends can only be detected on the basis of contextually-secure and chronologically well-constrained assemblages. Furthermore, it is only through abandoning existing traditional frameworks in favour of contextualized approaches (in which individual artefacts, knapping scatters and assemblages are considered the products of active hominin technological decision making, subsistence practices and cultural interactions) that we will be able to gain some insight into the factors responsible for the creation of the earlier Palaeolithic archaeological record and the genuine variability which it displays.

10.4 Lower Palaeolithic behaviour and landscape-use; the Orontes and Euphrates evidence in context

Arguably, the most rewarding aspect of any study concerning the earlier Palaeolithic archaeological record is the insights that it can provide into the behavioural practices of pre-modern humans. However, as previously demonstrated, traditional approaches to the study of the Lower Palaeolithic record of Syria have generally focussed on placing lithic assemblages within chrono-cultural evolutionary sequences, and which generally fail to take into account the impact of human agency on the creation of the archaeological record (see section 10.3). As a result, the potential insights which Lower Palaeolithic assemblages from the Orontes and Euphrates Valleys can provide into the behavioural practices and landscape-use associated with early Palaeolithic hominins have, hitherto, gone largely unrecognised.

Given that most Lower Palaeolithic archaeological assemblages have undergone some degree of post-depositional displacement, collections retaining sufficient resolution to enable the investigation of hominin behaviour on an ethnographic scale are rare. However, this does not necessarily mean that Lower Palaeolithic hominin behavioural and landscape practices can *only* be recreated using the small corpus of *in-situ* archaeological assemblages. It would be a mistake to exclude coarse-grained datasets from such studies as they are an important source of general information regarding early hominin lifeways. This is aptly illustrated by the present study, where reworked material from sites in the Orontes and Euphrates Valleys provided broad brush insights into hominin behavioural practices, emphasizing and expanding upon the ethnographic scale information provided by the few *in-situ* Lower Palaeolithic artefact accumulations from the study region (see below). Most of the Lower Palaeolithic artefact collections presented here fall into the category of coarse-grained datasets or "dredgers" (*cf.* Gamble 1994) consisting largely of fluvially reworked material (see chapters five and eight), with two notable exceptions; the Latamne "Living Floor" and Gharmachi 1 assemblages (see chapter five, sections 5.4 and 5.5). Both these collections were recovered from findspots in the Orontes Valley. They comprise artefact accumulations which have been subject to minimal fluvial displacement, and have provided some notable insights into Lower Palaeolithic hominin behaviour and landuse practices.

The Latamne material, in particular, has proved to be extremely informative. This assemblage comprises cores, flakes and handaxes which were recovered together in minimally disturbed clusters. Most are produced on fresh raw material brought into the area surrounding the site (either by humans or natural processes) from a chalk/limestone outcrop located ~120 m to the north-west. Nodules were then transported into the excavated area, partially decorticated, and then further worked. This area of the landscape may have been attractive as a source of fresh water; the river channel. Furthermore, although very few faunal remains were found in the excavated area, it is likely that this water source attracted carnivore and prey species, suggesting that carcases may have been immediately available. It is clear that the Latamne "Living floor" was a place in the landscape where the latter phases of artefact production took place. Also, although the site appears not to have been exposed for long, judging from the size of the lithic assemblage, the area probably acted as a focus for hominin activity on more than one occasion.

Similar behavioural and landuse patterns have emerged from the analysis of the Gharmachi 1 material. This site produced an assemblage of cores, flakes and handaxes, in most cases produced on cobbles similar to those found in the river gravels at the site. Although this suggests that the artefacts were produced on immediately available raw material, there is a suggestion that (as at Latamne) nodules were brought into the site partially decorticated. The presence of handaxe thinning flakes amongst the assemblage from Gharmachi 1 supports the contention that this was a place at which these roughed out nodules were further worked. Again, in the absence of faunal remains, it is difficult to assess why this particular location was an activity focus, although once more the congruence of available raw material and fresh water was probably important. Judging from the size of the assemblage from the site, it is likely that, as at Latamne, the locale was subject to repeated visits.

In sum, the data from Latamne and Gharmachi 1 suggests that Lower Palaeolithic hominin behaviour and landscape-use in the Orontes Valley included repeated visits to particular favoured places, that specific activities were carried out at these places, that there was a spatial division between where particular activities were carried out in the immediate vicinity of sites, and that artefacts and/or raw material were transported between points in the landscape. It also suggests that the presence of water and raw material sources may be factors in these repeated visits to favoured places. This therefore suggests that Lower Palaeolithic hominins were behaviourally complex and were specific in how they exploited their landscapes. However, it should be noted that this material also suggests that the scale on which these behaviours operated was limited, there being no indication that these patterns prevailed over long distances.

Although mostly fluvially derived, the other Lower Palaeolithic artefact collections studied here support the general pattern of hominin behaviour and landscape-use derived from the Latamne and Gharmachi evidence. All the other sites produced assemblages dominated by simple core and flake working, handaxes being present in greater or lesser numbers dependent on specific local affordances (see section 10.2). Furthermore, they predominantly reflect the exploitation of river gravels for artefact production, which supports the suggestion that hominins were utilising local raw materials. This is emphasized by the fact that when fresh artefacts are present amongst material from these collections, as is the case with the material from Rastan (see chapter five, section 5.3), and Halouanndji IV (see chapter eight, section 8.6), it is indicative of tool production having occurred at the locale using immediately available river cobbles.

This picture of Lower Palaeolithic landuse patterns in the Orontes and Euphrates Valleys emphasizes similar interpretations that have emerged from broadly contemporary sites in Europe, Africa and elsewhere in the Near East. In particular, minimally disturbed Lower Palaeolithic artefact occurrences consistently display evidence of organized technological behaviour reflected by the spatial and temporal separation of aspects of lithic procurement, knapping and discard, referred to as the *chaîne opèratoire*. Notable examples of this have been recorded amongst material recovered from the Boxgrove paleo-landscape in southern England. Here, remarkably fine grained archaeological accumulations have been recovered from sediments dated on the basis of mammalian biostratigraphy and lithostratigraphy to MIS 13 (Roberts and Parfitt 1999). The raw material used in the production of artefacts recovered from findspots in this region was almost exclusively obtained from talus deposits located at the foot of a chalk cliff, from which complete handaxes and tested nodules were recovered (Pope and Roberts 2005, 85).

Elsewhere in the Boxgrove paleolandscape knapping scatters associated with butchery events were encountered. For example, GTP 17 produced at least six lithic scatters associated with the butchered remains of a horse (Roberts 1999, Parfitt and Roberts 1999). Refitting studies have demonstrated that these debitage clusters are associated with all but the initial stages of handaxe manufacture, yet only two bifacial tools on flakes were recovered (Pope 2004, 41). Consequently, it seems that partially decorticated flint nodules obtained from chalk talus deposits located 40 m away at the base of the cliff were brought into the area (Roberts 1999, 376), worked to form handaxes (which were probably used to butcher a horse) and then removed (Pope 2004, 41). Similarly, Q2/A produced a spread of debitage (1,236 pieces) resulting from the continued reduction of partially worked blanks (Bergman and Roberts 1999, Pope 2004, 39); one refitting flake cluster from this area results from the later stages of the manufacture of a handaxe, which was not recovered (Pope 2004, 39). It therefore seems that the archaeology recovered from Q2/A relates to the flaking of partially worked blanks brought in from elsewhere, which were (at least in sometimes) subsequently taken away from the area (Pope 2004, 39).

Similar evidence of this separation of the *chaîne opèratoire* is evident at other European sites including Cagny-la-Garenne, Ferme de l'Epinette, Barnham and Beeches Pit. At Cagny-la-Garenne two excavated areas (La Garenne 1 and 2) have produced lithic artefacts associated with chalky slope deposits containing angular flints at the foot of a chalk cliff (Antoine 1994, 456, Tuffreau and Antoine 1995, 151). These deposits are interstratified with fluvial deposits forming part of the Garenne Formation of the River Somme terrace sequence (MIS 12/11; Tuffreau and Antoine 1995, 152, Bridgland *et al.* 2006, 441, Bahain *et al.* 2007, 360). The assemblage from La Garenne 1 is characterized by a high proportion of cortical pieces and handaxe roughouts (Tuffreau *et al.* 1997, 230), whereas the La Garenne 2 collection consists largely of tested nodules (Tuffreau *et al.* 1997, 232). Both are therefore characterized by artefacts from early in the reduction spectrum and seem to represent localities from which flint nodules were obtained, tested and partially decorticated, some presumably being selectively removed for further working elsewhere (Tuffreau and Antoine 1995, 152).

At the nearby site of Ferme de l'Epinette the spatial organization of technological behaviour later in the reduction sequence is apparent. Here lithic material was recovered from a palaeosol formed during MIS 10 (Tuffreau *et al.* 1997, 233). Although an area of 2,500 m^2 was exposed at the site, most of this material was found concentrated in an area of ~30 m^2 (Tuffreau *et al.* 1997, 236). The assemblage contains handaxes, cores and flakes. Many of the flakes form refitting groups, which can be related to cores and handaxes recovered from the site (Lamotte 1999). However, most refits involve semi and non-cortical flakes, suggesting that the earliest phases of the reduction process occurred outside the main artefact concentration (Tuffreau *et al.* 1997, 236, Hallos 2004, 31). A chalk talus and alluvial deposits was found 40 m from the main artefact concentration, from which the flint nodules used to produce most of the artefacts from the site were probably obtained (Tuffreau *et al.* 1997, 233). This conclusion is supported by the fact that a cortical flake found near the talus refits to a flaking sequence found amongst the main concentration. Interestingly, however, the core itself is actually missing, suggesting that it had been carried out of the site (Tuffreau *et al.* 1997, 236). Consequently, at Ferme de l'Epinette a dynamic and spatially segregated technological signature can be observed; decorticated blanks were carried into the area of the main concentration and further worked, some pieces being subsequently removed, presumably to be exploited elsewhere.

Similarly complex archaeological signals reflective of the spatial and temporal separation of the *chaîne opératoire* can be identified amongst the lithic assemblages recovered from Barnham and Beeches Pit, both in eastern England. At Barnham, artefacts including handaxes, flakes and cores were recovered from the margins of a channel dated to MIS 11, cut into till and glacio-fluvial deposits (Lewis 1998). The bulk of the material from the locale is associated with a lag gravel (known as the cobble band) which was primarily used for the manufacture of artefacts. However, once again there is a suggestion that different elements of the reduction process were carried out in different areas, with instances of the final stages of core working (and potentially handaxe finishing) occurring away from the cobble band, whilst in other instances small numbers of complete artefacts (including in one instance a single handaxe) were brought into particular areas (Ashton 1998a, 253).

At the nearby site of Beeches Pit human occupation has been identified located on the edge of a slow moving body of water associated with deposits attributable to MIS 11 (Preece *et al.* 2006, 489). Again, the material from this site reflects the segmentation of the *chaîne* *opératoire*. For example, Area AH at Beeches Pit produced just under 2,000 artefacts, many of which could be conjoined, clustered together around a concentration of flint nodules and an area of discrete burning. The nodules were probably obtained from the immediate environs of the site (Hallos 2004, Preece *et al.* 2006). This assemblage included a large number of tested nodules, and two refitting groups; one results from the initial working of a core which was subsequently removed from the excavated area. Notably, although the other refitting group can be related to a roughout discarded at the site, none of the flakes can be related to the four complete handaxes recovered, nor is there any evidence of the latter stages of handaxe production (Hallos 2004, 31). This assemblage therefore reflects the initial stages of core and handaxe working at a location to which finished artefacts were also brought and discarded (Hallos 2004, 31, Preece *et al.* 2006, 490).

Beyond temperate Europe similar structured technological behaviour is evident both at sites in Africa and at other sites in the Near East. Notable African examples include the lithic assemblages from Uppermost Member (UM) 1 of the Olorgesailie Formation, Kenya. These deposits form part of a ~80 m section of fine, polygenetic sediments (Potts *et al.* 1999, 748). Sedimentation estimates suggest that the UM 1 deposits accumulated in less than 1000 years, and they are time bracketed by tuff deposits dated by $^{40}Ar/^{39}Ar$ to 0.992±0.039 mya and 0.974±0.010 mya (Potts *et al.* 1999, 764). Located on the edge of a lacustrine basin, during this period the terrain was a homogenous plain crossed by watercourses whose channel fills contain little coarse sediment (Potts *et al.* 1999, 762). Consequently, UM1 of the Olorgesailie Formation does not include channel deposits with lava clasts large enough to have served as a raw material sources (Potts *et al.* 1999, 759). As a result, the artefacts recovered from UM 1 (or at least the lava blanks used to produce them) must have been brought in from the foothills of the nearby Mount Olorgesailie, where two main sources have been identified (Potts 1999, 1977).

Close to one of these lava outcrops is site AD1-1. This area provides parallels with locales such as the chalk taluses at Boxgrove, Cagny-la-Garenne and (potentially) Latamne, as it produced a dense concentration of artefacts associated with volcanic scree whose characteristics suggest "that hominid tool-makers were attracted to this place in order to quarry and test rocks for tool making purpose" (Potts 1999, 769). In addition, site AD1-1 is adjacent to another artefactually productive locale; site I3. This is the only location in UM 1 at Olorgesailie to have produced large collections of handaxes and other bifacial tools (Isaac 1977, Potts *et al.* 1999, 769). Consequently, it seems possible that blanks recovered and tested at site AD1-1 were further worked at site I3.

Other artefactually productive sites from UM 1 also suggest a spatially extended *chaîne opératoire*. For example site 15, located out on the plain away from the foothills of Mount Olorgesailie, has produced 2,322 lithic artefacts which were found in association with an almost complete skeleton of *Elephas recki*, one of whose ribs displayed evidence of cut marks (Potts *et al.* 1999, 768). The lithic assemblage includes biface trimming flakes (Potts *et al.* 1999, 768) suggestive of handaxe resharpening, these having been brought in from elsewhere. Furthermore, the excavator suggests that discoidal core reduction was common at the site (Potts *et al.* 1999, 768), which may be indicative of cores discarded subsequent to extensive reduction. Consequently this assemblage results from the opposite end of the reduction spectrum to that recovered from the AD1-1 findspot on volcanic scree. Notably similar patterns of structured technological behaviour can be seen at other Lower Palaeolithic sites in Africa including some of the Melka Kunture, Gadeb and Middle Awash findspots in Ethiopia (Chavaillon *et al.* 1979, Clark 1987) and at Mwanganda in Malawi (Clark and Haynes 1970).

In the Near East patterns relating to structured technological behaviour have rarely been discussed. The assemblages from Jisr Banat Yaqub are notable exceptions. For example, Area C at Jisr Banat Yaqub (see section 10.3) has produced flint debitage resulting from the latter stage of handaxe production, although the handaxes themselves were not present (Goren-Inbar and Sharon 2006, 131). This is particularly notable as the bulk of the lithic material from the site reflects the exploitation of large basalt blanks as a raw material source (Saragusti and Goren-Inbar 2001). Consequently, it seems that this location was a place in the landscape at which hominins both obtained and worked raw material, as well as bringing in artefacts which were further worked and then removed.

Structured technological behaviour is also apparent amongst other assemblages from the site dominated by basalt artefacts; handaxes and cleavers from Layer II-6, levels L1 and L4 (see section 10.2) were imported into the excavated areas as rough-outs (Madsen and Goren-Inbar 2004, 41). It should be noted, however, that all the artefacts found at Jisr Banat Yaqub are on raw material which could be obtained within a radius of several kilometres from the site (Madsen and Goren-Inbar 2004, 47). It is also interesting that Area C and Layer II-6, level 1 have both produced butchered faunal remains (Goren-Inbar *et al.* 1994, Rabinovich *et al.*, 2008). Similar structured approaches to technological decision making are also apparent at Nadaouiyeh Aïn Askar Level 8 which, as noted in section 10.3, produced an assemblage containing imported handaxes, discarded at the site fully worked, probably after being used to process ungulate carcases, in the course of which they were resharpened.

In sum, the lithic assemblages from the Orontes and Euphrates Valleys fit well within wider patterns of structured technological behaviour evident at broadly contemporary sites across Africa and Eurasia. That Lower Palaeolithic hominin behaviour can indeed be seen as structured to some degree, and not simply as the result of an unstructured sequence of acts, has itself an impact upon the composition and structure of the archaeological record. For instance, a broad contrast can be drawn between sites such as Latamne, Gharmachi 1, Cagny-la-Garrene, Ferme de l'Epinette, and findspots associated with the "cobble band" at Barnham and I3 at Olorgesailie where hominins discarded significant quantities of stone tools probably during several visits, and those such as GTP 17 at Boxgrove and Site 15 at Olorgesailie where the residues of individual events were retrieved.

Ashton (1998a) has suggested that that these differences can be related to the presence of "fixed" and "mobile" resources with the larger accumulations tending to accumulate at places in the landscape that combine factors such as fresh water, game concentrations, raw materials, vegetable resources and access routes between and through habitats, an argument which is consistently supported by the data. The sites listed above are all associated with static resources (in particular raw materials for stone tool production and sources of fresh water), whereas the lithic artefacts from locales such as GTP 17 at Boxgrove and Site 15 at Olorgesailie are carcase processing sites, and therefore associated with "mobile" resources. It is important, however, to recognize that artefact accumulations which reflect the exploitation of fixed and mobile resources are not necessarily mutually exclusive (Ashton 1998a, 257). This is particularly significant as even the best preserved Lower Palaeolithic artefact occurrences are often time-averaged accumulations which may have been deposited over hundreds of years (see Stern 1993, 1994).

It is worth noting that any study which takes as its starting point existing lithic assemblages is likely, by its very nature, to be dominated by sites at which "static" resources exert a significant influence. Engagement with mobile resources is more difficult to access - certainly on the basis of artefacts alone - and requires detailed taphonomic studies to determine whether, and in what way, hominins may have targeted and interacted with animals. It is currently not possible to examine the myriad ways in which Lower Palaeolithic hominins may have obtained protein within the Orontes and Euphrates Valleys, although they were clearly active at places at where animals were also present. In this regard, it is notable that humans have been argued to have procured at least some prey species through active hunting both at 'Ubeidiya (Gaudzinski 2004), the oldest securely dated site documented in the Near East, and at Jisr Banat Yaqub (Rabinovich *et al.* 2008). However, hominin-animal interactions are likely, like lithic technology, to have been highly variable and situation-specific.

One interesting aspect of the dichotomy posited between artefact accumulations which result from the exploitation of static and mobile resources is the fact that flaked tools (particularly handaxes) tend to be discarded at productive locations, not single episode butchery sites (Pope and Roberts 2005, 85). This may suggest that Lower Palaeolithic hominins tended to deposit such artefacts in areas where lithic resources were available. Illustrative of this is the fact that bifacial tools are rare from sites in UM 1 of the Olorgesailie Formation (away from the foothills of the Mount Olorgesailie and its associated sources of raw material) but are found in abundance at the I3 findspot which is located adjacent to a raw material source near the interface between the highlands and the lake basin (Potts *et al.* 1999). Notably Pope and Roberts (2005) suggest the presence of large quantities of tools in restricted areas (such as the I3 locale) may have perpetuated the use of such areas as multi-activity foci. A feedback mechanism was created, either though triggering occupation activity or increased tool discard, which led hominin groups to reiterate the successful landuse patterns of an earlier season.

This study demonstrates that Lower Palaeolithic artefact assemblages are the product of complex technological decision making and structured landuse practices. However, it would be wrong to over-emphasize this evidence of behavioural complexity. In particular it is important to recognize that, unlike in later periods (see section 10.8 below), Lower Palaeolithic hominins seem not to have been involved in the logistical targeting of specific areas of the landscape, but appear to have focussed their activity on places which provide a confluence of opportunities. Furthermore, the scale over which landuse patterns operate during this period needs to be considered. Despite the problems caused by time averaging and the fact that most Lower Palaeolithic artefact accumulations only provide "snapshots" of Pleistocene landscapes, enough evidence is available to consider this question. It seems that Lower Palaeolithic hominin landuse practices actually operated over hundreds of metres or a couple of kilometres (see Gamble 1999), as is apparent at most of the sites considered in this discussion, and especially at sites in the Boxgrove paleo-landscape (Pope and Roberts 2004, 90), Ferme de l'Epinette (Tuffreau *et al.* 1997, 233), Jisr Banat Yaqub (Madsen and Goren-Inbar 2004, 47) and Latamne (this study). Furthermore, even at Olorgesailie where relatively long distance artefact transport has been documented (Potts *et al.* 1999, 760) 99% of the artefacts are on local lava, the prevailing transport distance for which is ≤1-2 km (Potts 1994, 16).

In conclusion, this study has demonstrated that Lower Palaeolithic hominin groups operating in the Orontes and Euphrates Valleys were engaged in technological and landuse practices that correspond to those observed elsewhere in the region and at broadly contemporary sites in Africa and Europe. Admittedly, this is a broad brush picture, and should not be taken to suggest that every single aspect of Lower Palaeolithic technological decision making and landuse was the same everywhere and at every point during the vast amount of time represented by the Lower Palaeolithic archaeological record. What this analysis does, however, is contribute to an emerging picture of Lower Palaeolithic hominin groups who were not nailed to the floor, but engaged in complex, if spatially restricted, behavioural practices which go beyond traditional, static interpretations.

10.5 Handaxe makers and Levallois flakers: Middle Palaeolithic technology in the Orontes and Euphrates Valleys in context

Amongst the lithic material analysed in this thesis are collections which are ascribed on techno-typological grounds to the Middle Palaeolithic (see chapter three for further discussion). Unfortunately, all these collections either consist of undated surface finds, or are from deposits which can only be assigned to very tentative age ranges (see chapters six and nine). All, however, share broadly similar technological features, and display abundant evidence of Levallois flaking, whilst the majority also contains handaxes and/or evidence of handaxe production (see table 10.5.1). On the basis of the shared techno-typological features exhibited by these assemblages, previous researchers have considered these collections to be assignable to two temporal groupings - the Final Acheulean and the Levantine Mousterian - based largely on the relative presence of evidence for handaxe manufacture and "typical" Levantine Mousterian (i.e. Levallois) products (Clark 1966a; 1967, Hours 1979, Muhesen 1985; 1992, Copeland and Hours 1993, Copeland 2004).

The reasoning underlying these correlations is intimately entwined with fundamental assumptions that are deeply rooted in traditional approaches to Middle Palaeolithic lithic artefact variability in the Near East. Historically, Middle Palaeolithic artefact variability in the region has been underpinned by lithic assemblages recovered from Tabun Cave, located on the south bank of Wadi el-Mughara (Nahal Me'arot) in Palestine/Israel ~3.5 km east of the present day Mediterranean coastline (Garrod 1937, Jelinek *et al.* 1973, Jelinek 1981; 1982a; 1982b, Ronen and Tsatskin 1995, Ronen *et al.* 2000, Gisis and Ronen 2006). The deeply stratified deposits from this site produced late Lower and Middle Palaeolithic assemblages from five broad "layers" referred to as F, E, D, C and B. The earliest of these, layers F and E, produced what are termed "Upper Acheulean" and "Acheulo-Yabrudian" (Garrod 1956) assemblages characterized by handaxes and scrapers in varying proportions, which towards the top of the sequence are interstratified with an assemblage characterized by elongated products (Jelinek 1981, 272)[3]. The three overlying layers (D, C and B) contain "Levantine Mousterian" assemblages, typically containing large numbers of Levallois products and few, if any, handaxes (handaxes have been reported from layer D, but Bar-Yosef (1994, 34) has suggested these may be intrusive). These products, however, display morphological variability which has been suggested to have chrono-cultural significance (e.g. Garrod 1937, Copeland 1975, Jelinek 1982a, Meignen and Bar-Yosef 1991, Shea 2003). Those from layer D are characterized by elongated products, in contrast to the layer C assemblages, which display proportionally more ovoid products, and the layer B collections which are characterized by the presence of high frequencies of broad based, squat points.

Site	River Valley	Preferred date	Previous typo-techno. attribution	No. of Non-Lev. cores	No. of simple prep. cores	No. of Lev. Cores/ Prods.	No. of h/axes	No. flakes /flake tools
Tahoun Semaan 2 and 3	Orontes	?MIS 7	Final Acheulean	127	3	36/4	41*	190/6
Tulul Defai	Orontes	Unknown	Final Acheulean	172	19	77/2	53*	251/6
Chnine East 1	Euphrates	Unknown	?Final Acheulean	181	20	12/3	0*	405/2
Chnine West 1	Euphrates	Unknown	?Final Acheulean	84	4	17/2	2	246/1
Qara Yakoub	Sajour	Unknown	Late Acheulean and M.	N/A	1	37/3	71	N/A
Latamne 'Red Colluvium"	Orontes	<MIS 12	Levantine Mousterian	6	0	4/0	0	76/8
Tahoun Semaan 1	Orontes	?<MIS 7	Levantine Mousterian	13	1	5/0	1*	35/1
Rhayat 2	Balikh	?MIS 6-MIS 4	Levantine Mousterian	100	15	6/6	1	203/1

*Table 10.5.1 Composition of lithic assemblages from Middle Palaeolithic sites studied in the Orontes and Euphrates Valleys (previous techno-typological attributions taken from Clark 1966a; 1967, Hours 1979, Copeland and Hours 1993 and Copeland 2004; * = handaxe thinning flakes present in assemblage).*

The lithic assemblages from Tabun were some of the first late Lower/early Middle Palaeolithic collections to be widely published from the Near East (e.g. Garrod 1937). This,

[3] Assemblages containing large numbers of elongated products including blades, but only rare handaxes are often referred to as "Amudian" assemblages. Collections assigned to the Amudian have been found interstratified with Acheulo-Yabrudian assemblages, as at Tabun, and below Acheulo-Yabrudian levels, as at Abri Zumoffen on the Lebanese coast (Garrod and Kirkbride 1961. Copeland 1983a).

along with the fact that they form part of one of the most extensive Palaeolithic sequences from the region, led them to become something of a yardstick against which to measure other collections. The Tabun sequence thus came to be considered as a strict chrono-cultural type sequence, reflecting technological stasis and change throughout the Levant (e.g. Copeland 1975, Ronen 1979, Jelinek 1981; 1982a, Meignen and Bar-Yosef 1988, Bar-Yosef *et al.* 1992). Variability within assemblages ascribed to particular phases within the Tabun type sequence are increasingly acknowledged (e.g. Meignen 1995; 1998; 2000, Hovers 1997; 1998, Goren-Inbar and Belfer-Cohen 1998), and this entrenched linear view of late Lower/early Middle Palaeolithic regional lithic assemblage variability has been challenged (e.g. Marks 1983; 1992). However, the general tenets of this sequence - namely that industries with handaxes predate Levallois assemblages and that those dominated by elongated Levallois products predate those with ovoid and/or squat points - are, by and large, still adhered to (e.g. Shea 2003; 2006, Bar-Yosef 2008, 870-871).

Against such a background, it is unsurprising that assemblages from the Orontes and Euphrates Valleys that combine evidence of handaxe production and significant amounts of Levallois flaking have traditionally been assigned to a late Lower/early Middle Palaeolithic typo-technological variant termed the "Final Acheulean" (Hours 1979). Furthermore, it is equally unsurprising that such assemblages have therefore been termed "industries of transition" (Copeland and Hours 1993, 112), combining elements of Lower and Middle Palaeolithic lithic technology. However, research carried out over the last decade is beginning to demonstrate that late Lower Palaeolithic/early Middle Palaeolithic artefact variability in the Near East is more complex than previously thought and cannot be adequately accounted for by traditional linear chrono-cultural frameworks.

Over the last two decades there have been significant advances in absolute dating of Middle Palaeolithic assemblages from the Near East. Summarized in table 10.5.2, these indicate that despite some conflicting dates provided by different techniques (most notably in the case of the TL and ESR dates from Tabun) important observations can be made. Although there is a general pattern which may suggest that the three-phase division of the "Levantine Mousterian" is chronologically significant, there are some marked anomalies. For example, the Tabun D type assemblages from 'Ain Difla and Yabrud 1 (possibly also Zuttiyeh and Misliya) are broadly contemporary with, or even post-date, the Tabun C type assemblages from Tabun and Hayonim, whilst some assemblages (such as that from Tor Faraj) have been argued to display characteristics indicative of both Tabun D and Tabun B type affinities (Henry *et al.* 1996, 32). In addition, it should be recognized that these divisions mask considerable variability between assemblages. For example, the late Middle Palaeolithic assemblages from Amud Cave in Galilee reflect a decrease in elongated products through time, whereas at Kebara Cave on Mount Carmel, broadly contemporary assemblages display the opposite trend (Hovers 1998; 155). Consequently, although the division of the "Levantine Mousterian" may indicate some chronological patterning, its usefulness as an analytical tool is questionable.

Significantly, the absolute dates outlined in table 10.5.2 also challenge the assertion that there is a chronological division between late Lower Palaeolithic assemblages with handaxes (Acheulean and Acheulo-Yabrudian) and early Middle Palaeolithic assemblages dominated by Levallois flaking (although it appears that handaxes become scarce, or are indeed absent from later Middle Palaeolithic assemblages). These dates actually demonstrate that artefact collections from the Near East dated to the period ~250 kya and ~150 kya display considerable technological variability. Some contain handaxes but generally lack evidence of Levallois flaking (e.g. Holon; Chazan 2007b), whilst others display evidence of Levallois flaking but lack handaxes (e.g. Hayonim Lower Level E; 'Ain Difla and Rosh Ein Mor; Crew 1976, Meignen 1995, Lindley and Clark 1987, Clark 2000). Indeed, there are others that display clear evidence of both (e.g. Birket Ram; Goren-Inbar 1985, the lowest deposits in Jerf Ajla Cave; Schroeder 1966; 1969 and several Mousterian collections from Yabrud Rockshelter 1; Solecki and Solecki 1995, 383). As a result, it appears that traditional interpretations which portray a strict techno-chronological division between late Lower Palaeolithic and early Middle Palaeolithic assemblages can no longer be justified.

In addition to the complications produced by recent absolute dates, it is increasingly clear that traditional approaches to the characterisation of late Lower/early Middle Palaeolithic assemblages fail to account for the full range of techno-typological variability. This is because such approaches have relied heavily on Bordes' (1961) typological classifications of lithics, in particular Levallois products, as a way of quantifying artefact variability. However, over the last two decades an increasing awareness that morphologically similar artefacts, in particular Levallois products, are not necessarily the result of the same technical approach to debitage production has emerged (e.g. Marks and Volkman 1983; Boëda 1995, Marks and Monigal 1995, Meignen 1995). One notable result has been the realisation that some Tabun D type assemblages - such as those from Rosh Ein Mor (Marks and Monigal 1995), Hayonim Unit F and Lower Unit E (Meignen 1998, Meignen 2000), Abu Sif (Neuville 1951, 47-60, Meignen 2000, 177), 'Ain Difla rockshelter (Lindley and Clark 1987, Clark 2000), Doura Cave Layer IV (Akazawa 1979b, Nishiaki, 1989), and Jerf Ajla Layers F and E (Richter *et al.* 2001) - are not only characterised by the production of elongated Levallois products, but also by prismatic blade production.

Site	Context	Typo-technological attribution	TL	ESR - EU	ESR - LU	U-series	Other	Source
Birket Ram	*Upper Karmim basalt*	Late Acheulean					>233±22 (Ar/Ar)	Feraud *et al.* (1983)
Jamal Cave	*Flowstone*	Acheulo-Yabrudian				>112-227		Weinstein-Evron *et al.* (1999)
Qesem	*Lower Units*	Acheulo-Yabrudian				>382*		Barkai *et al.* (2003)
Qesem	*Upper Units*	Acheulo-Yabrudian				>152*		Barkai *et al.* (2003)
Tabun	*Layer Ed*	Acheulo-Yabrudian		262±32*	330±43*		387+41 -28 (ESR US)	Rink et al. (2004a)
Tabun	*Unit IX-XIII (Layer E)*	Acheulo-Yabrudian	306±33 - 350±33					Mercier and Valledas (2003)
Tabun	*Layer E*	Acheulo-Yabrudian		149±17 - 198±51	191±28 - 213±32	208 +102 - 44		Grün and Stringer (2000)
Yabrud 1	*Level 18/19*	Acheulo-Yabrudian		222±17*	256±14			Porat *et al.* (2002)
Tabun	*Layer D*	Tabun D Type	263±27*					Mercier *et al.* (1995)
Tabun	*Unit IX (Mid layer D)*	Tabun D Type	222±27*					Mercier and Valledas (2003)
Tabun	*Unit V (Mid layer D)*	Tabun D Type	222±27*					Mercier and Valledas (2003)
Tabun	*Unit II (Upper-most layer D)*	Tabun D Type	196±21*					Mercier and Valledas (2003)
Tabun	*Layer D*	Tabun D Type		133±15*	203±26*	143 +41 -28		Grün and Stringer (2000)

Site	Context	Typo-technological attribution	TL	ESR - EU	ESR - LU	U-series	Other	Source
Hayonim	*Level F (Deep Sounding)*	Tabun D Type	210±28*/ 210±21*					Mercier *et al.* (2007)
Hayonim	*Lower Level E (Deep Sounding)*	Tabun D Type	186±20*					Mercier *et al.* (2007)
Hayonim	*Lower Level E (Central Area)*	Tabun D Type	160±22*/ 168±21*					Mercier *et al.* (2007)
Hayonim	*Level E*	Tabun D Type		177±12*	182±15*	>155+2.9 - 1.4		Rink *et al.* (2004b)
Holon	*Artefact horizon*	Middle Acheulean					204±20 (OSL)*	Porat (2007)
Holon	*Artefact horizon*	Middle Acheulean					196±17 (ESR - CU)	Porat (2007)
Holon	*Artefact horizon*	Middle Acheulean					219±22 (ESR - CU)	Porat (2007)
Rosh Ein Mor	*Artefact horizon*	Tabun D Type				201±9*		Rink *et al.* (2003)
Hayonim	*Upper Level E (Central Area)*	Tabun C Type	156 ±19*					Mercier *et al.* (2007)
Tabun	*Layer C*	Tabun C Type	171±17*					Mercier *et al.* (1995)
Tabun	*Unit I (Layer C)*	Tabun C Type	165±16*					Mercier and Valledas (2003)
Tabun	*Layer C*	Tabun C Type		120±16*	140±21*	135 +60 -30		Grün and Stringer (2000)
Hummal	*Lower levels*	Acheulo-Yabrudian				156±16		Hennig and Hours (1982)
Umm el Tlel	*Lower levels*	Acheulo-Yabrudian				139±16		Hennig and Hours (1982)

Site	Context	Typo-technological attribution	TL	ESR - EU	ESR - LU	U-series	Other	Source
'Ain Difla	*Level 5*	Tabun D Type	105±15					Clark *et al.* (1997)
'Ain Difla	*Level 12*	Tabun D Type		115±14	166±21			Clark *et al.* (1997)
'Ain Difla	*Level 19*	Tabun D Type		96±12	155±21			Clark *et al.* (1997)
'Ain Difla	*Level 20*	Tabun D Type		88±12	143±21			Clark *et al.* (1997)
'Ain Difla	*Level 20*	Tabun D Type		113±15	186±27			Clark *et al.* (1997)
Misliya Cave	*Unit II*	Tabun D Type					130±33 (OSL)	Weinstein-Evron *et al.* (2003)
Yabrud 1	*Level 4*	Tabun D Type					115±17 (ESR-ESS)*	Porat and Schwarz (1991)
Yabrud 1	*Level 4*	Tabun D Type					139±21 (ESR-ESS)*	Porat and Schwarz (1991)
Zuttiyeh	*76ZU 4*	Acheulo-Yabrudian				148±6		Schwarz *et al.* (1980)
Zuttiyeh	*Mousterian*	Tabun D Type	106±7*					Valladas *et al.* (1998)
Zuttiyeh	*Mousterian*	Tabun D Type	157±13*					Valladas *et al.* (1998)
Tabun	*Layer B*	Tabun B Type		102±17	122±16	104 +33 -18		Grün and Stringer (2000)
Qafzeh	*XVII-XXIII*	Tabun C Type	92±5*					Valladas *et al.* (1988)
Qafzeh	*XV-XXI*	Tabun C Type		96±13*	115±15*			Schwarz *et al.* (1988)

Site	Context	Typo-technological attribution	TL	ESR - EU	ESR - LU	U-series	Other	Source
Skhul	*Layer B*	Tabun C Type	119±8*					Mercier *et al.* (1993)
Skhul	*Layer B*	Tabun C Type		80.8±12.6*	101±17.9*			Stringer *et al.* (1989)
Habonim	*Unit II*	Mousterian					90±20 (RTL)	Ronen *et al.* (1999)
Far'ah II	*Artefact horizon*	Mousterian		49.1±4.1*	62±7*	72.5±2*		Schwarz and Rink (1998)
Amud	*B1*	Tabun B Type	57.6±3.7*					Valladas *et al.* (1999)
Amud	*B2*	Tabun B Type	65.5±3.5*					Valladas *et al.* (1999)
Amud	*B4*	Tabun B Type	68.5±3.4*					Valladas *et al.* (1999)
Amud	*B1/6-B1/7*	Tabun B Type				53±7*		Rink *et al.* (2001)
Amud	*B2*	Tabun B Type				61±9*		Rink *et al.* (2001)
Amud	*B4*	Tabun B Type				70±11*		Rink *et al.* (2001)
Amud	*B1-2*	Tabun B Type					61±8.6 (ESR-ETT)*	Rink *et al.* (2001)
Kebara	*Unit VII*	Tabun B Type	51.9±3.5*					Valladas *et al.* (1987)
Kebara	*Unit VIII*	Tabun B Type	57.3±4*					Valladas *et al.* (1987)
Kebara	*Unit IX*	Tabun B Type	58.4±4*					Valladas *et al.* (1987)

Site	Context	Typo-technological attribution	TL	ESR - EU	ESR - LU	U-series	Other	Source
Kebara	*Unit X*	Tabun B Type	61.6±3.6*					Valladas *et al.* (1987)
Kebara	*Unit X*	Tabun B Type		60.4±8.5*	64.3±9.2*			Schwarz *et al.* (1989)
Kebara	*Unit XI*	Tabun B Type	60±3.5*					Valladas *et al.* (1987)
Kebara	*Unit XII*	Tabun B Type	59.9±2.5*					Valladas *et al.* (1987)
Umm el Tlel	*III2a*	Tabun B Type	36±2.5				34.53±0.8 (C-14)	Bourguignon (1996)
Jerf Ajla	*Layer C*	Tabun B Type	33.3±2.3*					Richter *et al.* (2001)
Tor Faraj	*Layer C*	Tabun D/B Type	48.0±2.7*					Henry (1998b)
Tor Faraj	*Layer C*	Tabun D/B Type					69±5 (AAR)	Henry and Miller (1992)
Tor Sabiha	*Layer C*	Tabun D/B Type				31.5±5		Henry (1998b)
Tor Sabiha	*Layer C*	Tabun D/B Type					69±6 (AAR)	Henry and Miller (1992)
Quneitra	*Artefact horizon*	Mousterian		39.2±4.2*	54±5.2*			Ziaei *et al.* (1990)

*Table 10.5.2 Selected published age ranges for Middle Palaeolithic assemblages in the Near East (see figure 10.1.1; * = mean value). Key: TL = thermoluminesence, ESR-EU = electron spin resonance early uptake model; ESR-LU = electron spin resonance linear uptake model; U-series = uranium series; Ar/Ar = $^{40}Ar/^{39}Ar$; OSL = optically-stimulated luminance; ESR US = coupled ESR-$^{230}Th/^{234}U$; ESR-ESS = electron spin resonance on burnt flint by signal subtraction; RTL = radio thermoluminesence; ESR-ETT = electron spin resonance and thermal ionisation spectrometric $^{230}T/^{234}U$; C-14 = Radiocarbon; AAR = amino-acid racemization*

Significantly, the recognition of prismatic blade production amongst Tabun D type assemblages has implications for how we view the Tabun sequence, as it suggests that rather than showing changes in Levallois blank production, it in fact reflects a decrease in prismatic blade production through time and an increasing dominance of Levallois flaking. Such a contention may be supported by the fact that not only are prismatic blades common amongst the Tabun layer D assemblage, but on average, complete flakes become thinner with respect to width throughout the sequence (Jelinek 1981, 75). This is also indicative of the presence of elevated numbers of prismatic blades in the earlier levels.

It is a distinct possibility that this increased appreciation of the complexity of technological responses evident amongst Tabun D type assemblages may only be the tip of the iceberg. For instance, Acheulo-Yabrudian and Amudian assemblages can include a bewildering array of techno-typological variety. Some assemblages contain large quantities of handaxes (e.g. Bezez, Tabun Unit XII and Misliya Cave; Garrod 1966, Jelinek 1981, Gisis and Ronen 2006, Zaidner 2006), whilst others can contain very few or none at all (e.g. Abri Zumoffen and Tabun Unit XIII; Garrod and Kirkbride 1961, Jelinek 1981, Copeland 1983a, Gisis and Ronen 2006). Some also contain significant numbers of elongated products including blades (e.g. some Acheulo-Yabrudian assemblages from Yabrud 1 and the Amudian assemblages from Tabun and Abri Zumoffen; Garrod and Kirkbride 1961, Jelinek 1981; 1982a; 1990, Copeland 1983a, Meignen 1994). Furthermore, as research has historically focussed on the products found in these assemblages, their technological characteristics are poorly understood and they may actually result from several volumetric approaches to core working, including Levallois flaking and prismatic blade production. This is an issue which requires further investigation; however, it appears that the Acheulo-Yabrudian is not a single monolithic entity, and may in fact encompass a multitude of technological approaches to stone tool production.

Clearly, artefact variability within the late Lower and early Middle Palaeolithic does not necessarily follow linear evolutionary trajectories and is far more complex than traditional interpretations suggest. However, this is not to say that there are no chronological trends in assemblage composition during the course of the Middle Palaeolithic. In fact, Levallois flaking increasingly dominates lithic assemblages during this period, with handaxes largely disappearing from later Middle Palaeolithic collections, whilst prismatic blades (as opposed to metrical blades) may potentially become less common over time. This patterning indicates that previous researchers (e.g. Hours 1979, Muhesen 1992, Copeland and Hours 1993, Copeland 2004) were broadly correct in suggesting that many of the typo-technologically Middle Palaeolithic assemblages studied in this thesis (in particular those from the Orontes

Valley) can be dated to the earlier part of this period. However, rather than considering these collections as "industries of transition" (see above), such assemblages potentially reflect increased technological variability during the early Middle Palaeolithic.

Having acknowledged the rich technological diversity apparent during the earlier Middle Palaeolithic, the challenge is how to investigate and explain it. This question can be viewed on at least two levels: a narrow focus, in which differences between individual assemblages are considered, and a wider view, in which general chronological trends - in particular the apparent decrease in technological variability - are the main subject of analysis. When one focuses in from the broader picture, variability between Middle Palaeolithic assemblages can be seen as the result of a number of factors. These include technological flexibility, site function, artefact curation and transport, duration of occupation, and intra-site differences in the use of space.

The lithic assemblages from Quneitra and Far'ah II clearly illustrate the technological flexibility apparent within the Middle Palaeolithic in the Near East. These sites have produced two broadly contemporary artefact collections (see table 10.5.2), both associated with the acquisition of animal carcases, but with technologically distinct lithic assemblages. Quneitra, located in the Golan Heights, Syria, is situated within a basalt landscape on the paleo-shore of a fresh water pool (Heimann 1990). The mammalian faunal assemblage from the site represents few carcases but consists of a wide variety of species including *Bos primigenius*, *Equus caballus*, *Equus hydruntinus/mauritanicus*, *Gazella gazella*, *Dama mesopotamica*, *Cervus elaphus*, *Dicerorhinus hemitoechus* and *Capra aegagrus* (Rabinovich 1990). Many elements display cut marks indicative of disarticulation, defleshing and dismemberment, or evidence of splintering bones to extract marrow (Rabinovich 1990). The lithic assemblage associated with these faunal remains comprises two elements: a larger collection of cores, flakes and flake tools produced on flint blanks (the nearest sources of which are found 10-18 km from the site; Hovers 1990); and a smaller number of artefacts on immediately available basalt blanks.

The flint component of the Quneitra lithic assemblage is clearly a transported and curated tool-kit. It is characterized by non-cortical debitage (very few cortical flakes were recovered), large numbers of flake tools, Nahr Ibrahim truncations (see chapter three), diminutive Levallois cores and a small number of Levallois points (Goren-Inbar 1990). Although there is some confusion concerning nomenclature, the Levallois cores from the site seem to have either undergone a final phase of centripetal recurrent exploitation (many such examples are described as discoidal by the excavator, but from their description it is apparent that they conform to the volumetric definition of Levallois cores and have undergone a final phase of centripetal recurrent exploitation; see Goren-Inbar 1990, 122) or have been re-prepared but unexploited (described as product of 'recurrent' mode, but again see description in Goren-Inbar 1990, 114). In contrast, the basalt artefacts recovered from Quneitra simply consist of material resulting from the *ad hoc* flaking of immediately available blanks (see Goren-Inbar 1990, 139).

Far'ah II is located in the north-western Negev on the banks of the Wadi Ghazzeh (Nahal Besor) and has produced faunal and lithic material from two levels within fine grained sediments overlying flint-rich conglomerate (Gilead 1980; 1995, Gilead and Grigson 1984). The upper horizon was the most thoroughly sampled and has formed the central focus of discussion. Notably, it produced lithics and faunal remains associated with a burnt area, interpreted as a hearth (Gilead and Grigson 1984, 79). The faunal assemblage is dominated by three species (*Equus hemionus/asinus*, *Bos primigenius* and *Alcelaphus* sp.), all herd animals which during dry seasons would have congregated near a permanent water source, such as the spring adjacent to the site in the Wadi Ghazzeh. This would have provided a concentration of seasonally predictable resources (Gilead and Grigson 1984, 93). Although almost every bone recovered from the site is fractured (which may itself be indicative of marrow extraction by humans), it has been suggested that entire carcases were originally present (Gilead and Grigson 1984, 89). Furthermore, limited evidence of cutmarks has been recorded on bones from the site, whilst the clear spatial association between the lithics and the faunal remains has been used to argue that humans were primarily responsible for the accumulation (Gilead and Grigson 1984, 91). One particularly notable piece of evidence for human involvement is the presence of broken flint associated with percussion marks partially embedded in the marrow cavity of a long bone (Gilead and Grigson 1984, 92).

Significantly, and in contrast to the bulk of the material from Quneitra, the lithic assemblage from Far'ah predominantly reflects expedient core working (Hovers 1997) of locally available wadi pebbles (Gilead 1980, 55). Evidence of Levallois flaking is largely restricted to Levallois products, including points (Gilead and Grigson 1984, 75, Gilead 1995, 86). Furthermore, complete reduction sequences are present, as evidenced by several near-complete refitting sequences (Gilead and Grigson 1984, 81, Gilead and Fabian 1990, Gilead 1995, 82). Consequently, although the Quneitra and Far'ah lithic assemblages were discarded at places in the landscape at which Middle Palaeolithic hominins were engaging in broadly similar activities, they diverge technologically; the former has produced an assemblage largely indicative of transport and intense curation, whilst the latter reflects the *ad hoc* flaking and discard of immediately available blanks. This clearly reflects the flexibility inherent in Middle Palaeolithic technological repertoires, something which is further emphasized by the fact that the small numbers of artefacts on local raw material from Quneitra are technologically more like the Far'ah lithic assemblages than the other material from the site.

The technological features of the Far'ah lithic assemblage and the basalt artefacts from Quneitra also reflect the tasks carried out by humans at these places. Both are places at where animal carcases were processed using locally available stone, flaked to produce cutting edges. Similar *ad hoc* local patterns associated with butchery have been observed in southern French sites such as Mauran, Coudoulous and La Borde (Mellars 1996). Some Middle Palaeolithic sites in the Near East have also produced lithic assemblages which reflect hominins extracting raw material and engaging in the initial stage of blank production. Such assemblages are located directly on or adjacent to sources of raw material and contain large numbers of cores and cortical debitage. Several examples of such assemblages have been described in this thesis, including the Latamne "Red colluvium" site on the Orontes (see chapter six, section 6.4), along with Chnine East 1 and Chnine West 1 on the Euphrates (see chapter nine, Sections 9.3 and 9.4). Other similar assemblages from the wider region include Doura Locality 38 in the Palmyra basin, Syria (Akazawa 1979a) and Tirat Carmel located at the western foot of Mount Carmel, Palestine/Israel (Ronen 1974).

Transport and curation also have an important influence on the composition of, and variability between, assemblages. This is particularly well demonstrated by ephemeral artefact collections from palaeosols found at several findspots along the northern coastal plain of Palestine/Israel (Garrod and Gardener 1935, Ferrrand and Ronen 1974, Ronen 1977; 1995, Ronen *et al.* 1999), as well as at Amrit on the Syrian coast (Haller 1941 Besançon *et al.* 1994, 16). These palaeosols are found interstratified between sandstone deposits ("Ramleh"/"Kurkar") and are located away from raw material sources. They have produced remarkably homogenous assemblages which mainly comprise Levallois products, Nahr Ibrahim truncations and small, heavily reduced Levallois cores (some of which even appear to have been flipped, with the striking platform being reconfigured as a flaking surface prior to discard; see Ronen 1995, figure 2.3 drawing number 2). Such pieces arguably represent transported and curated artefacts that have been discarded in the context of use.

The suggestion that Levallois was a highly mobile and curated technology was most clearly demonstrated by Geneste (1985; 1989) in his study of Middle Palaeolithic assemblages from the Aquitaine Basin in the south-west of France, and is also apparent from the analysis of other assemblages from across the Near East, including those from Quneitra (see above), Umm el Tlel (Boëda *et al.* 2001) and Yabrud 1 (Solecki and Solecki 1995, 390) in Syria, 'Ain Difla (Clark 2000) and J447 (Olsen 1997) in south-west Jordan, as well as Kebara (Bar-Yosef *et al.* 1992), Amud (Hovers 1997; 1998) and Hayonim in Palestine/Israel (Meignen *et al.* 2006, 154). Such patterns are reinforced by the data presented in this thesis - most notably the collections made in the Orontes Valley at Tahoun Semaan 2 and 3, Tulul Defai and Tahoun Semaan 1 (see chapter six, sections 6.2, 6.3 and 6.5). However it is clear that transport and curation amongst Middle Palaeolithic collections from the region is not limited to Levallois cores and products. Indeed, this study has suggested that handaxes may also have been treated in such a way (see chapters six and nine), whilst evidence from Hayonim (Meignen *et al.* 2006, 154) and potentially Abu Sif in the Judean Hills (Neuville 1951, 47-60, Meignen 2000, 177) suggests that prismatic blade cores and elongated products may also have been transported and curated.

Linked to this is the fact that occupation duration and intensity also has a profound effect on the composition of artefact assemblages. This is demonstrated by the contrast between the two assemblages from the Tor Sabiha and Tor Faraj rockshelters in south-western Jordan (Henry 1992; 1994; 1995). Tor Sabiha has produced a lithic assemblage dominated by tool maintenance and rejuvenation, with very few cores being present, argued to be indicative of ephemeral occupations. In contrast, Tor Faraj has produced lithic material which reflects extended reduction sequences, and includes less portable artefact inventories, considered to reflect more prolonged periods of occupation (Henry 1995). Similar contrasts have been drawn between assemblages from Hayonim and Kebara (Meignen *et al.* 2006).

In addition, it should be noted that intra-assemblage variability can also have a major influence on the composition of Middle Palaeolithic artefact assemblages in the Near East. There is clear evidence for the segregated organisation of space within individual occupations levels at several sites. For instance, the open-air site at Rosh Ein Mor in the central Negev has produced a horizontal and vertical concentration of Levallois points, burins and endscrapers in one area of the site, whilst cores and primary flakes were concentrated elsewhere (Hietala and Steven 1977). Other examples of such clear spatial patterning of artefacts have been recorded from Kebara Cave where larger lithic pieces, in particular cores, were preferentially recovered amongst a concentration of mammalian faunal remains and ash dumps located along north wall of the cave (Schick and Stekelis 1977, 102, Goldberg and Bar-Yosef 1995, Speth and Tchernov 1998, Speth 2006) and at Tor Faraj where separate concentrations of Levallois cores and points were identified (Henry 1998a).

In sum, it is clear that variability between Middle Palaeolithic artefact assemblages from the Near East results from a complex interplay between a number of factors which include (but are not necessarily restricted to) technological flexibility, site function, artefact curation and transport, duration of occupation, and intra-site differences in the use of space. It should be noted that the relationship between these factors is not static, as they are clearly inter-related. Together they reflect diverse hominin landuse practices and behavioural flexibility. However, particular time-transgressive patterns are also beginning to emerge, which may reflect a changing emphasis upon the particular technological strategies favoured by hominin groups in the region. In the Near East, these chronological patterns seem to include an increased emphasis upon Levallois flaking as a preferred method of flake production, a move away from handaxe production, and a possible decrease in prismatic blade production.

We are only just beginning to fully comprehend the variety of technological options adopted by Middle Palaeolithic hominins in the Near East, and any patterning in long-term trends needs further examination before firm conclusion can be drawn. Currently, the evidence indicates that an immense array of possible strategies were employed throughout the region during the earlier Middle Palaeolithic. In contrast, by the later Middle Palaeolithic, Levallois flaking had become increasingly, though not exclusively, dominant. How, then, might such patterns be explicable? One potential explanation is the concept of "rugged fitness landscapes" (Palmer 1991, Kuhn 2006, 117). A term adopted from population studies, this theoretical concept asserts that successful permutations of a population's adaptation can be depicted graphically as high points (or "fitness peaks") and less successful adaptations as low points. It is argued that selection will direct populations towards adaptive configurations leading to higher levels of fitness, but that populations will tend to follow the trajectory closest to their starting position, since historical factors (including those relating to environment and, arguably, cultural conditions) have a structuring effect. Once a population has begun to follow a particular trajectory, however, it is very difficult for it to adopt another, as this necessarily involves a reduction in fitness, something which evolutionary processes do not generally favour. Importantly though, sub-optimal fitness peaks can alter in response to environmental or demographic factors.

The application of the concept of rugged fitness landscapes to the Middle Palaeolithic record from the Near East may therefore allow us to account for the fact that, on one hand, technological approaches to flintworking are variable, changeable and dynamic, whilst on the other, particular technological strategies can become dominant. However, this leaves us with the question of why Levallois flaking dominates the technological repertoire of later Middle Palaeolithic hominins? The fact is that there is no simple answer to this question.

Levallois is clearly a technology suited to the diverse hominin behaviour and landuse practices of Middle Palaeolithic hominins; it lends itself to curation and mobility, but most of all, it is *flexible* - maybe more so than handaxe and prismatic blade technology. Perhaps, therefore, flexible Levallois flaking gave hominin groups an adaptive advantage over other technological strategies during the later Middle Palaeolithic in the Near East? At present, however, such a contention is largely speculative and before any firmer conclusions can be reached further research is required.

10.6 Levallois Origins and Variability in the Near East

One particular aspect of Middle Palaeolithic variability in the Near East that has been subjected to sustained scrutiny is Levallois technology. Debates concerning this technological strategy, both within the region and beyond, frequently revolve around two main topics; origins, and the nature and meaning of variability. Questions relating to Levallois origins are often tied up with biological issues. In particular, prepared core technologies, such as Levallois, are often implicitly or explicitly equated with changes in the cognitive capacities of human species and, as such, have been used as proxies with which to track dispersals of human groups out of Africa (e.g. Foley and Lahr 1997, Lahr and Foley 1998).

Although dating is problematic, it seems that by ~300-200 kya increasing diversity in prepared core working practices is apparent in Africa. This includes Levallois core working, which has been identified amongst collections recovered from locations within Members K3 and K4 of the Kapthurin Formation located west of Lake Baringo in the Kenyan Rift Valley dated to >284±12,000 kya (McBrearty and Tryon 2006). Other prepared core working techniques potentially datable to this period (or maybe earlier) include "Victoria West" reduction strategies found at sites in southern Africa (McNabb 2001, Kuman 2001, Sharon and Beaumont 2006, Sharon 2007) and Tabelbala-Tachenghit core working, which has been identified from sites in the Maghreb region of North Africa (Tixier 1957, Biberson 1961, Sharon 2007). Some see this evidence as indicative of an African origin for Levallois technology, where it emerged sometime prior to MIS 8 (e.g. Sharon and Beaumont 2006, 196). Furthermore, Foley and Lahr (1997, Lahr and Foley 1998) suggest that geographical distribution of early prepared core technologies in Africa indicates that prior to MIS 7 the Sahara acted as a barrier to population movements into Europe via the Near East and that as a result prepared core technologies only became widespread outside of Africa during and after MIS 7, when climate amelioration allowed for the rapid dispersal of human populations associated with prepared core techniques. However, even ignoring the potential problems inherent in viewing all core preparation techniques as behaviourally analogous and the difficulties in considering stone tools as equivalent to biological populations, there are a number of problems with this scenario.

The posited African origin for Levallois technology requires that it appeared in the Near East and Europe later than in Africa (i.e. no earlier than MIS 7), but in both regions of Eurasia there is compelling evidence for the emergence of local technological traditions which equate, in volumetric terms, to Levallois flaking, at around the same time that it emerges in Africa (~300,000 - 250,000 kya). Although there are relatively few well-dated Near Eastern sites attributable to before MIS 7 (see table 10.5.2) significant amounts of Levallois material have been recovered from deposits dating to >233.3 kya at Birket Ram in the Golan Heights, Syria (Feraud *et al.* 1983; Goren-Inbar 1985).[4] Furthermore, in Europe significant collections of Levallois material dating to MIS 8 and earlier have been recovered at Mesvin IV (Cahen and Michel 1986) in Belgium, Orgnac 3 (Moncel and Combier 1992, Moncel *et al.* 2005) and Achenheim (Junkmanns 1991; 1995, Rousseau *et al.* 1998) in France, Markleeberg (Baumann and Mania 1983, Eissmann 2002) in Germany, and Baker's Hole (Scott 2006) and Purfleet (White and Ashton 2003) in England.

Not only is there evidence for Levallois flaking in the Near East and Europe at least as early as there is in Africa, but the emergence and lasting adoption of the technology appears grounded in existing technological repertoires. In the case of the Near East, this is illustrated by assemblages analysed here that reflect the sporadic appearance of simple prepared cores amongst Lower Palaeolithic artefact collections, such as those from Jrabiyat 2 in the Orontes Valley and Ain Abu Jemaa in the Euphrates Valley (see table 10.3.1). Such cores combine principles of Levallois core reduction in an organic fashion through the exploitation of existing core convexities to produce blanks preferentially from one dedicated flaking surface.

The incipience of Levallois flaking in Lower Palaeolithic debitage systems in the Near East may also be apparent in some handaxe assemblages from the region. DeBono and Goren-Inbar (2001) have suggested that the presence of preferential removals on some handaxes from Tabun Layer E and El Hamari (Ma'ayan Barukh) may indicate a link with the principles of Levallois flaking. It is debatable, however, whether this alone is sufficient to demonstrate such a link as the presence of a large, preferential flake on a handaxe may equally relate to an attempt to thin the volume of the artefact, rather than being geared

[4] It has been suggested that Levallois cores used to produce cleaver blanks have been reported from deposits at Jisr Banat Yaqub which are thought to date to ~0.78 mya (Versosub *et al.* 1998, Goren-Inbar *et al.* 2000), however, it has recently been stated (Madsen and Goren-Inbar 2004, 45) that these cores do not conform to Levallois concept as defined by Boëda (1986, 1995, Boëda *et al.* 1990; see chapter three).

towards blank production through the flaking of a surface. Having said this, amongst the artefacts highlighted by DeBono and Goren-Inbar are seven handaxes from El Hamari (MIS 13/12; see section 10.3) which have had a striking platform imposed on them from which preferential flakes have been removed. Similar examples have also been reported from as yet poorly dated deposits identified in Revadim Quarry located in the southern coastal plain of Palestine/Israel (Marder *et al.* 1998, Gvirtzman *et al.* 1999, Marder *et al.* 2006). Such pieces clearly do represent the removal of blanks from a dedicated surface and consequently provide much clearer evidence of a link with the principles which underlie Levallois flaking.

In short, the evidence from the sites studied in this thesis combined with that from the wider region suggests that Levallois technology was deeply rooted within Lower Palaeolithic lithic working practices in the Near East. Consequently, it would seem that the appearance (and indeed eventual dominance) of Levallois flaking amongst artefact assemblages from the region is the result of a particular local trajectory - or as Copeland (1995, 172) has put it "the Levallois concept did not arrive fully formed [in the Near East] like Venus on her Cypriot beach". This would therefore seem to support White and Ashton's (2003) assertion that the imminence of Levallois within existing technological systems means that it is meaningless to try and locate a single point of origin for Levallois reduction strategies.

Whilst the origins of Levallois have commanded a great deal of academic attention, the nature and meaning of variability within Levallois has also emerged as a key concern. Over the course of the last two decades increasing emphasis has been placed on identifying the technological procedures which lead to variability in Levallois core reduction (e.g. Tixier *et al.* 1980, Boëda 1986; 1995, Boëda *et al.* 1990, Van Peer 1992; 1995). In the Near East this has led to a widespread adoption of the volumetric definition of the Levallois technique, proposed by Boëda (Boëda 1986, 1995, Boëda *et al.* 1990; see chapter three). This definition enabled the identification of a variety of methods employed to achieve Levallois blank production, both in terms of how cores are prepared and exploited. Significantly, the adoption of a volumetric definition of Levallois has allowed researchers to identify the enormous variability inherent in both Levallois preparatory and exploitation strategies in the Near East (e.g. Meignen and Bar-Yosef 1991, Bar-Yosef 1992, Meignen 1995; 1998, Hovers 1997; 1998, Boëda *et al.* 2001), which is further emphasized by the data presented in this study (see chapters six and nine). However, although of undeniable importance, this emphasis on how Levallois variability is produced has meant that the reasons for such variability have received comparatively little attention.

Arguably, this lack of attention to causal factors can be tied to the fact that the volumetric definition proposed by Boëda is tied to a very specific view of how technology becomes set within human societies. Boëda's approach to Levallois variability is heavily influenced by the work of Gilbert Simondon, whose philosophy of technological systems and how they evolve argues that a technological system or "method" can become saturated, and therefore fixed, within a society if the technological criteria which define it are so closely integrated that they cannot be dissociated (see Audouze 1999). This concept has been taken by Boëda (1986; 1995, *et al.* 1990) and combined with the dominant view amongst French anthropologists of technologies as primarily social processes (most notably expressed in the work of André Leroi-Gourhan; see Leroi-Gourhan 1993). As a result, Levallois "methods" are considered to represent the totality of the technical knowledge learned, applied and taught. This body of knowledge testifies to successive acquisitions transmitted from generation to generation and consequently constitutes the techno-cultural heritage of a group. Variability between Levallois methods is therefore accounted for by the assertion that they constitute conceptually separate guiding plans of action, which operate according to fixed rules shaping each structure. Consequently, it is arguable that there has been little incentive for researchers who have adopted the volumetric definition of Levallois variability to explain the variability that they identify, as the theoretical assumptions which underlie Boëda's widely applied methodology provide an explanation of themselves.

As a result, most explanations of variability in Levallois methods from Near Eastern contexts follow Boëda in considering them to be a product of different technological traditions (e.g. Goren-Inbar and Belfer Cohen 1998, Kaufman 2001, Meignen 2000, Hovers 2001) resulting from systems of learning and teaching (Hovers 1997, Hovers 1998, Meignen 2000). However, it is difficult to consider Levallois methods as representative of technological traditions which are the product of separate guiding plans of action, as during core reduction different methods may be applied throughout a particular sequence; only rarely is one modality used exclusively (Dibble 1995, Meignen 1995, Schlanger 1996). Furthermore, as Baumler (1995, 12) has pointed out, core working is by its very nature a reductive process which leads to the continual redefinition of the potential of the core for subsequent removals.

This inherent flexibility in Levallois flaking is evident in the archaeological record. For instance, Schlanger's (1996) refitting work on "Marjorie's" core from Site C at Maastricht-Belvédère in the Netherlands consummately documents changes in Levallois methods throughout reduction. Furthermore, one common pattern, particularly amongst cores which have been heavily reduced, is a change from unidirectional recurrent exploitation to centripetal preparation and lineal exploitation in the final stage of Levallois core working (e.g. Baumler 1988, Meignen and Bar Yosef 1991, Baumler and Speth 1993, Hovers 1998). Indeed, this process may in fact lead to cores no longer conforming to the volumetric definition of Levallois in their final form, many becoming discoidal (Lenoir and Turq 1995, Ohnuma 1995, Yalçinkaya 1995, 405; see also chapters six and nine in this study). In addition, these changes in reduction strategy may also be reflected in variation in the form of Levallois cores and products in an assemblage. It has been suggested that relatively high frequencies of small radial cores in some Tabun "D Type" assemblages dominated by laminar blanks may reflect a shift in Levallois reduction methods (Kuhn 1995b, 162), whilst a similar argument has been invoked for the presence of numerous Levallois points but very few point cores in the assemblage from unit XXVIII at Ksar Akil cave in Lebanon (Marks and Volkman 1986, 11). Therefore, the principles at work are not merely static representations of clear "mental templates" (as implied by arguments which invoke the presence of different technological traditions), but are fluid, with Levallois flaking effectively enacted "in-hand" (Schlanger 1996, 248).

Arguably, therefore, although the appreciation of variability within Levallois through the adoption of a volumetric definition was central to the identification and quantification of the Levallois flexibility, it at the same time imposed *a priori* a static framework upon a dynamic process (*cf.* Baumler 1995), which in turn limited our ability to assess underlying causal factors. This therefore leaves us with the question of what factors influenced the variability exhibited amongst Levallois material from Near Eastern contexts.

This study has demonstrated that variability in the application of particular preparatory and exploitation methods during Levallois flaking is intimately linked to, and reflective of, Middle Palaeolithic behaviour and landscape-use. For example, in their final form many of the Levallois cores from Tulul Defai and Tahoun Semaan 1, 2 and 3 in the Orontes Valley (see chapter six, sections 6.2, 6.3 and 6.5) are small, heavily reduced and potentially extensively curated, properties which are reflected in the fact that they tend to be thin and often retain remnants of the distal ends of large scars on their striking platform surface – these having been very much truncated by successive phases of working. Most display evidence of a final attempt to remove a single flake through lineal exploitation subsequent to final phase of convexity preparation using centripetal removals. Such a preparatory strategy was necessary to re-establish Levallois convexities following protracted recurrent exploitation, and the resulting final Levallois surface is too small to allow the removal of anything but a single product. Furthermore, discoidal cores are often encountered amongst the core assemblage from these sites, sometimes in very large numbers (e.g. Tulul Defai), which may suggest that recurrent phases of exploitation on Levallois cores with such properties may sometimes result in them becoming volumetrically discoidal.

Interestingly, however, this study has also demonstrated that although the methods of preparation and exploitation applied to Levallois cores may be the same, the factors responsible for such approaches being adopted may differ from site to site (and indeed from core to core). For instance, as in the Orontes Valley assemblages, Levallois cores from the sites of Chnine East 1 and Chnine West 1 in the Euphrates Valley and Qara Yaaqoub overlooking the River Sajour (see chapter nine, sections 9.3, 9.4 and 9.5) generally display preparation using centripetal removals and lineal exploitation. In the Orontes Valley this seems to be related to the fact that they have undergone intensive reduction, but in the Euphrates the relatively small size of the nodules on which they were produced seems to have been an over-riding influence. This is demonstrated by the fact that Levallois cores from these sites lack remnant distal portions of larger scars on their striking platform surface (indicative of several phases of preparation and exploitation) and appear to be on clasts whose reductive potential was from the beginning limited. For all that, what this data does show is that the dominant method of preparation and exploitation applied in the final phase of Levallois flaking on cores from both the sites in the Orontes and Euphrates Valleys is dependent upon the volume and reductive potential of the blanks available.

The importance of the volume and reductive potential of a nodule/core in shaping the Levallois method adopted by Middle Palaeolithic hominins is further emphasized by the assemblages studied in this thesis which contain large numbers of simple prepared cores (e.g. Rhayat 2 and Chnine East 1; see chapter nine, sections 9.2 and 9.3). These assemblages are on particularly small clasts which do not allow for extensive preparation of a flaking surface. However, in order to circumvent this problem, it appears that at these locations, clasts with natural convexities were deliberately selected to enable the controlled flaking of the surface. Notably, these cores are similar to those identified by Kuhn (1995a; 1995b) amongst "Pontinian" assemblages in Italy which display an analogous reflexive approach to Levallois core reduction in the face of restrictive raw materials.

Thus far it has been suggested that the Levallois methods adopted by Middle Palaeolithic hominins in the Near East are heavily influenced by volumetric factors linked to raw material constraints, hominin behaviour and landscape-use. However although this would appear to be true of most, if not all, of the Levallois assemblages considered in this thesis; elsewhere in Near East there is evidence that preparatory strategies were deliberately selected to produce particular types of Levallois products. This is most clearly demonstrated by assemblages which display evidence of Levallois point production. As the assemblages from Amud B1-B4 (Hovers 1995; 1998), Hayonim Lower Level E (Meignen 1998, 174) and Kebara IX-X (Meignen and Bar-Yosef 1991; 1992, Meignen 1995) demonstrate, this was most commonly achieved through unipolar recurrent convergent flaking, maximising production from a single core. The general lack of such approaches to Levallois flaking amongst the material studied here could suggest that Levallois point production was not practiced by the hominins responsible for these assemblages. However, given the general lack of Levallois products from these sites and evidence from collections such as that from level XXVIII at Ksar Akil Cave in Lebanon (Marks and Volkman 1986, 11), which contain numerous Levallois points but very few point cores, such a conclusion should be treated with caution.

Methods of Levallois preparation and exploitation therefore vary both in response to particular volumetric constraints (whether imposed by the raw material or by previous reductive trajectories) and in response to particular objectives. However, what is most clear is that Levallois flaking is a flexible process which, rather than being conceived by hominins as a proscriptive set of rules for action, is worked out through ongoing engagement with the material. Consequently, it is almost certain that the factors responsible for Levallois variability varied from site to site and from core to core, and that those outlined herein are just an indication of the full complexity which may potentially have influenced the approaches to Levallois flaking taken by Middle Palaeolithic hominins. To borrow a phrase used by Copeland (1995, 172), perhaps what discussions of Levallois variability over the last two decades have most clearly illustrated is, "what our grandmothers already knew: there are more ways than one to skin a cat".

10.7 Contextualising Middle Palaeolithic behaviour in the landscape in the Orontes and Euphrates Valleys

Over the past twenty years, researchers have begun to rehabilitate Middle Palaeolithic hominins. Previously characterised as marginal scavengers, incapable of planning ahead or of any technological innovation, it is now recognised that their behaviour, whilst differing from that of Upper Palaeolithic human groups, is itself dynamic and complex (see papers in Hovers and Kuhn 2006). Isotopic evidence has demonstrated that Middle Palaeolithic hominins were top level carnivores at the upper end of the food chain (Bocherens *et al.* 1999, Richards *et al.* 2000), whilst analyses of faunal assemblages have clearly illustrated that they were capable hunters, frequently focusing on prime adult prey (Stiner 1994; Stiner 2006, 217, Shea 1998, Boëda *et al.* 1999, Gaudzinski 1999, Speth and Tchernov 1998; 2001, Yeshurun *et al.* 2007). Furthermore, it is evident that they engaged in flexible subsistence strategies which involved a variety of prey acquisition strategies (Conard and Prindiville 2000, Patou-Mathis 2000, Gaudzinski 2006) and varying levels of residential mobility

(Lieberman and Shea 1994, Meignen *et al.* 2006) Indeed, evidence from cave and rockshelter sites including Kebara (Speth and Tchernov 1998, Speth 2006), Amud (Hovers *et al.* 1991: 156), Tabun (Albert *et al.* 1999) and Tor Faraj (Henry 1998a, Henry *et al.* 2004), as well as from open air sites such as Rosh Ein Mor (Hietala and Stevens 1977), demonstrates that Middle Palaeolithic hominins also engaged in the spatial structuring of their living spaces.

This flexibility and behavioural complexity is evident from the lithic assemblages studied in this thesis, which exhibit technological variability reflective of their place within wider strategies of Middle Palaeolithic landscape-use. All of the assemblages studied are from open-air sites. Most are located on valley-sides, in immediate association with lithic raw material and, consequently, display evidence of activities relating to raw material extraction and exploitation (e.g. Tahoun Semaan 2 and 3, Tulul Defai, Chnine East 1 and Chnine West 1; see table 10.7.1). Because most are also surface collections - palimpsests reflective of repeated visits to these locations - it is also possible to see evidence of long-term, cyclical relationships between these sites and their wider landscape settings. Many of these sites were probably locations where hominins not only engaged in what could be termed "gearing up" activities, but also discarded existing tool kits. Conversely, the small collection of artefacts from the Latamne "Red Colluvium" may, unlike the rest of the valley side locations on raw material sources, represent an example of a site subject to just a single visit, as it displays only the "gearing up" element of this strategy.

The most obvious exception to this general pattern of landscape-use is the artefact assemblage from Tahoun Semaan 1. This site has produced lithic material characteristic of discard in the context of use (see chapter six, section 6.5) and is the only ephemeral site encountered in this study located away from a raw material source, in a valley bottom. The patterns of landscape-use apparent from this study is arguably analogous to that previously observed in the Southern Limberg in the Netherlands (Roebroeks *et al.* 1992, Kolen *et al.* 1999 De Loecker 2006), where a cyclical relationship has been recognised between open-air sites on the Limberg plateau and those they overlook in the Maas Valley below (Maastricht-Belvédère). Here, sites located on the valley sides have produced lithic assemblages very similar in composition to the bulk of those studied during this thesis (save for a lack of evidence of handaxe production) which are suggestive of Middle Palaeolithic hominins discarding exhausted tool-kits and "gearing up" up on the higher ground in situations which provided access to raw materials and positions for monitoring the valley below, whilst sites in the valley bottom have produced assemblages of artefacts primarily discarded in the context of use.

Site	River Valley	Preferred Date	Number of Artefacts Studied	On RM source?	On-site technological actions	Beyond-site technological actions
Tahoun Semaan 2/3	Orontes	?MIS 7	419	Yes	Nodule selection; core working and flake production; core and flake discard; handaxe working; discard of handaxes (particularly fragments)	Cores transported into site; selected cores(?) and products transported off-site; handaxes / handaxe blanks transported into site; handaxes transported out of site
Tulul Defai	Orontes	Unknown	584	Yes	Nodule selection; core working and flake production; core and flake discard; handaxe working; discard of handaxes (particularly fragments)	Cores transported into site; selected cores(?) and products transported off-site; handaxes / handaxe blanks transported into site; handaxes transported out of site
Chnine East 1	Euphrates	Unknown	627	Yes	Nodule selection; core working and flake production; core and flake discard; handaxe production and/or maintenance	Cores and/or products transported into site; selected cores(?) and products transported off-site
Chnine West 1	Euphrates	Unknown	363	Yes	Nodule selection; core and flake production; core and flake discard; discard of handaxes	Cores and/or products transported into site; selected cores(?) and products transported off-site
Qara Yakoub	Sajour	Unknown	112	Yes	Nodule selection; core and flake production; core and flake discard; handaxe discard	Handaxe production; selected cores(?) and products transported off-site
Latamne "Red Colluvium"	Orontes	<MIS 12	94	Yes	Nodule selection; primary decortication and initial core working	Selected cores and products(?) transported off-site
Tahoun Semaan 1	Orontes	?<MIS 7	56	No	Limited flake production; handaxe resharpening	Blank selection; initial stages of core working; handaxe production
Rhayat 2	Balikh	?MIS 6-MIS 4	334	Yes	Nodule selection; core working and blank production; core and flake discard; handaxe discard	Cores transported in to site; selected cores(?) and products transported off-site

Table 10.7.1 *Inferred technological actions undertaken both at the sites and beyond the sites considered in this study.*

Notably, the assemblages studied support the suggestion that Levallois was a highly mobile and curated technology (see chapters six and nine), as is also apparent from the analysis of other assemblages from across the Near East (see section 10.5). However, perhaps even more significantly, this study additionally suggests that handaxes were exploited in a similar way by Middle Palaeolithic hominins (see chapters six and nine). Unfortunately, the exact relationship between approaches to landscape-use and the adoption of these different technological strategies is difficult to assess on the basis of the evidence considered here. Moreover, the variety of technological strategies adopted by Middle Palaeolithic hominins in the Near East - encompassing handaxe production, Levallois flaking and indeed prismatic blade production (see section 10.5) - still demand investigation in their landscape context.

One way of looking at differential treatment of place within Middle Palaeolithic landscapes is through using the terminology developed by Turq (1988; 1989). He proposed that different types of open-air site can be distinguished within the southern Perigord, France, on the basis of the stages of lithic reduction undertaken at individual sites, as well as, to a lesser degree, the types of artefacts discarded at particular locations. The four locality types which Turq identified are termed "extraction and exploitation", "extraction and production", "mixed strategy" and "episodic" sites. "Extraction and exploitation" localities are situated in close proximity to raw material sources, and produce lithic assemblages which are dominated by cortical debitage, containing "tested" nodules bearing a restricted number of removals. Similarly, "extraction and production" localities are also on or adjacent to raw material sources; however, such assemblages typically contain lithic material which reflects all stages of artefact manufacture, but few retouched tools or Levallois products - these having been transported for use elsewhere. Notably, elements of nearly all of the assemblages studied in this thesis fulfil these criteria for "extraction and production" localities (see table 10.7.1). However, only the assemblage from the Latamne "Red Colluvium" can be assigned solely to this category, as the others display at least some evidence of more complex strategies.

Consequently, and following Turq's terminology, most of the Middle Palaeolithic assemblages studied in this thesis are indicative of "mixed strategy" sites. They contain evidence for all stages of lithic reduction, but are distinguished from "extraction and production" sites by high frequencies of heavily reduced cores. Significantly, like the "mixed strategy" sites identified by Turq, those considered here tend to be located on higher ground, overlooking the valley bottoms. However, ascribing particular sites to any one category is not necessarily straightforward; Chnine East 1 and Chnine West 1 are notable in this regard (see chapter 9, sections 9.3 and 9.4). Whilst the predominant technological actions undertaken at both locations accord with Turq's definition of "extraction and production" sites - raw material being selected and worked on-site, whilst specific items were subsequently exported - there are also some suggestions that material was imported and discarded (as might be expected at a "mixed strategy" location). This demonstrates that although useful as heuristic devices for broadly categorizing Middle Palaeolithic sites, such definitions break-up what is essentially a continuum of hominin landscape-use practices. They cannot, however, be considered as rigid expressions of the differential use of space by Middle Palaeolithic humans, particularly as the assemblages upon which they are based and which they are used to categorize represent time-averaged palimpsests.

Turq's (1988) final group of sites is characterised as "episodic" occupations. These are smaller than those from the other types of site, reflective of restricted knapping activities related to specific actions. Assemblages from such sites typically comprise a few retouched tools or unretouched flakes, or products resulting from the flaking of only a limited number of selected blanks; the material from Tahoun Semaan 1 presented here is just such a site. Arguably, patterns of landscape-use similar to those described by Turq are evident amongst the Middle Palaeolithic sites documented in this thesis; a separation is apparent between ephemeral, specialised sites away from raw material sources, and those located immediately adjacent to lithic sources where raw material was selected, blanks were prepared and endproducts produced. However, it also seems that beyond these broad categories, greater variation and complexity is apparent.

When one considers Middle Palaeolithic open-air sites from the Near East as a whole, a broad contrast between ephemeral sites away from raw material sources and those located on or near to a raw material source is evident. Sites located in close proximity to sources of raw material tend to represent localities at which the focus of activity appears to have been the extraction of raw material and the production of artefacts. Examples of such sites can be found at Tirat Carmel, near the western foot of Mount Carmel (Ronen 1974) and at localities in Upper Galilee (Barkai *et al.* 2006), the Negev (Marks 1981; 1988), the Palmyra basin (Akazawa 1979a) and the foothills of the Jebal Al-Bishri, north of El Kowm (Le Tensorer *et al.* 2001). In contrast, sites located away from raw material sources tend to produce ephemeral artefact collections associated with specific activities. A notable example of this was recovered from Layer VIIa0 at Umm el Tlel in central Syria (Boëda *et al.* 2001, 19-22). Located on the edge of a permanent water source, this unit produced a few retouched and rejuvenated products seemingly discarded after having been brought into the site as personal gear and used in the butchery of animal carcases. Similarly, the J447 findspot located on the edge of the Wadi Aheimar in south-west Jordan produced a small assemblage argued to be characteristic of a procurement camp, probably associated with the acquisition of animal resources (Olsen 1997).

However, as in the Orontes and Euphrates Valleys, variation and complexity is apparent in how Middle Palaeolithic hominins moved through their landscapes that goes beyond this simple division. For instance, the site at Ar Rasfa in northwest Jordan potentially displays a cyclical relationship with its landscape setting. This site is located on a raw material source and has produced an assemblage indicative of initial blank processing - large numbers of cores abandoned in the early stages of reduction and a flake assemblage dominated by cortical debitage (Shea 1998, 77). However, heavily reduced discoidal cores and cores on flakes are also "surprisingly common" (Shea 1998, 74) amongst the Ar Rasfa assemblages. Arguably, these represent a heavily curated tool kit which was abandoned at a location where a new source of flake blanks was available. Similarly, some sites located on or adjacent to raw material sources were not places at which hominins were simply engaging in artefact production. At Far'ah II (see section 10.5) a lithic assemblage has been recovered which reflects the flaking of local wadi pebbles in order to produce products for carcase processing (Gilead and Grigson 1984).

Sites away from raw material sources also display enormous variability. Some consist of just a few artefacts, such as the sporadic occurrence of artefacts amongst palaeosols found interstratified between sandstones along the coasts of Palestine/Israel and Syria (Haller 1941, Ronen *et al.* 1999; see section 10.5). Others consist of much larger artefact accumulations and appear to be associated with specific activities. One notable example is Holon, located on the northern coastal plain of Palestine/Israel south of Tel Aviv. The artefacts recovered here were found concentrated in a soil located on the edge of a slope overlooking marsh formed by blocking of the paleo-Ayalon river by dune formation (Nester and Chazan 2007, 25). They were found in association with faunal assemblage consisting of three main taxa: *Palaeoloxodon antiquus*, *Bos primigenius* and *Dama dama cf. mesopotamica* (Monchot and Kolska Horwitz 2007b).

The pattern of bone fragmentation of the Holon faunal assemblage suggests that the bones of larger animals were preferentially fractured in order to procure marrow (Monchot and Kolska Horwitz 2007a, 139); some are also cutmarked (Monchot and Kolska Horwitz 2007a, 151). Cutmark distributions on *Bos* and *Dama* remains (the two most common species) suggest that the former were processed to remove joints of meat, whilst the carcases of the latter were more completely disarticulated (Monchot and Kolska Horwitz 2007a, 154). In addition, body part representation suggests that some elements of the deer carcases were removed from the area (Monchot and Kolska Horwitz 2007a, 148). It is unclear whether humans accessed these carcases through hunting and/or scavaging (Monchot and Kolska Horwitz 2007a, 154).

The lithic assemblage from Holon consists of handaxes, cores, flake tools and unmodified flakes (Chazan 2007a; 2007b). Evidence of Levallois flaking is rare (or perhaps totally absent); core working been described as volumetrically exploiting three faces (Chazan 2007b). Although all artefact classes appear to have been produced on river cobbles (Chazan 2007b, 81), there is some suggestion that the material used to produce the handaxes was obtained from a different source to that used to produce other artefacts (Chazan 2007b, 83). Furthermore, the handaxes may have been manufactured off-site, with core working and flake tool manufacturing occurring on-site (Chazan 2007b, 83, Kolska Horwitz and Chazan 2007, 191). The fact that a large proportion of the flake assemblage (approaching 50%) is retouched, many forming multiple tools (Chazan 2007a), suggests artefact resharpening in the context of use, as may the large number of flakes displaying Nahr Ibrahim truncations (Chazan 2007a, 47). It therefore seems that Holon represents a marsh-edge locality within which carcases were predictably available (either through hunting and miring, or scavenging), into which hominins carried, used and discarded a curated tool kit.

The apparent dichotomy between sites located on or next to raw material sources and task specific sites away from them is further blurred by the presence of large artefacts collections away from raw material sources which do not result from short term, task specific occupations. One example is Rosh Ein Mor on the banks of the Nahel Zin in the Negev (Crew 1976). This site is situated adjacent to a fossil spring and has produced a large collection of artefacts (n=>40,000 - relatively few of which are cores; Crew 1976) preserved in fine grained overbank deposits filling a shallow depression (Goldberg 1976) which is argued to have been occupied for extended periods (Hietala and Stevens 1977). However, the site is not located directly on a raw material source (Marks and Monigal 1995, 268). As a result, Rosh Ein Mor is argued to have been used as a base camp logistically provisioned through a "radiating mobility" strategy (Munday 1976; 1979, Marks and Freidal 1977).

Thus far the focus of this discussion has been exclusively on open-air sites. However, much of the Middle Palaeolithic record from the Near East has been recovered from caves and rockshelters. Such locations further highlight the complexity and variability in landscape-use associated with Middle Palaeolithic hominins. Broadly speaking, occupation within caves and rockshelters can be classed as either ephemeral, or more long term. Sites with evidence of ephemeral occupation include Hayonim (Meignen *et al.* 2006, 154). The lithic and faunal assemblages from this site are argued to be characteristic of short-term residential camps, forming part of high mobility landuse strategy (Meignen *et al.* 2006, 155). Although complete reduction sequences are present at the site, there is evidence that Levallois products, non-Levallois laminar blanks and debitage products were imported (Meignen *et al.* 2006, 154). Most are on locally (if not immediately) available raw material, although some come from up to 30-40 km away (Delage *et al.* 2000). The associated faunal assemblage is indicative of low density exploitation of ungulates and tortoises (Stiner *et al.* 2000). The mortality profile of the ungulate remains is indicative of targeting prime age adults (Stiner 2006, 217), whilst the faunal assemblage composition suggests that the Hayonim hominins were enjoying meat-rich diets of high-yield prey (Stiner 2005). Other cave sites which have produced similar evidence of ephemeral occupation include Tor Sabiha (Henry 1992; 1995) and 'Ain Difla (Clark 2000).

Such sites have been contrasted with the evidence from Kebara cave which reflects regular, anticipated occupations and comparatively low residential mobility (Meignen *et al.* 2006). Here, large accumulations of material along the cave walls have been identified; these comprise ash dumps, knapping debris and animal bones (Schick and Stekelis 1977, 102, Goldberg and Bar-Yosef 1995, Speth and Tchernov 1998, Speth 2006). Furthermore, the lithic assemblages reflect "provisioning of place" (*cf.* Kuhn 1995a; Meignen *et al.* 2006, 157). Blanks were obtained within a 10-15 km radius of the site (Shea 1991 quoted in Meignen *et al.* 2006, 157) and all stages of reduction were undertaken at the site, cores being discarded once productive flaking was no longer possible (Meignen and Bar-Yosef 1991, 1992). The site has also produced a large and intensively butchered faunal assemblage (Speth and Tchernov 2001). Additionally, there are some suggestions of seasonal occupation; the large accumulations of gazelle and fallow deer remains result from early winter and/or spring hunting (Speth and Tchernov 2001). However, notable quantities of legumes may imply spring to early summer occupation, whilst pistachio nuts and acorns indicate occupation during the autumn (Lev *et al.* 2005). Other cave sites which appear to have been occupied in a similar way to Kebara include Tor Faraj (Henry 1995; 1998a) and Amud (Hovers 1998).

It has been suggested that differences in mode of occupation have chronological significance. Changes in settlement patterns between the early and the late Middle Palaeolithic may reflect an increase in local population levels, and shifts in hominin mobility strategies in response to seasonal and more long-term changes in the distribution and abundance of resources (Lieberman and Shea 1994, Hovers 2001, Meignen *et al.* 2006). However, there are difficulties in accepting that differences in landscape-use practices are chronologically significant. This is perhaps most clearly demonstrated by the evidence from Tor Faraj and Tor Sabiha rockshelters. These two sites appear to have been occupied broadly contemporaneously during the later Middle Palaeolithic (see table 10.5.2), but they were occupied in different ways. Tor Faraj reflects longer-term, more structured occupation; the lithic assemblage reflects fairly complete on-site reduction of imported material, and includes large, presumably less portable, elements. In contrast, Tor Sabiha appears to be a monitoring location with more ephemeral occupation and a lithic assemblage resulting from tool maintenance and rejuvenation (Henry 1995; 1998a).

When open-air sites are also considered, any long-term chronological changes in mobility patterns and landuse strategies appear even more tenuous. For example, Rosh Ein Mor has produced a large assemblage, arguably the result of deliberate provisioning of place, in much the same way as at Kebara. However, recent dating work has demonstrated the material from this site is closer in age to Hayonim (Rink *et al.* 2003; see table 10.5.1). Consequently, it seems that rather than having long-term chronological significance the differences in hominin practices identified between assemblages from cave sites probably reflects different elements of the same system of landscape-use. It should also be borne in mind that the large artefact and faunal accumulations from cave sites are time-averaged palimpsests, which may conflate and mask different elements of landuse and mobility patterns.

Middle Palaeolithic hominins in the Near East clearly lived complex and complicated lives. This is especially apparent when one considers patterns of landscape-use apparent from the region as a whole, and is also reinforced by evidence from the Orontes and Euphrates Valleys. Different sites can reflect very different landuse practices, but do seem to have been deliberately treated as different places; places were targeted for particular purposes, and not simply as undifferentiated snapshots of activity undertaken in all parts of the landscape. The Lower Palaeolithic record of the region also reflects similar differential treatment of place (see section 10.4), but differences of scale and complexity are also apparent. During the Lower Palaeolithic, one sees less protracted evidence for artefact transport, and different places in the landscape do not seem to be cyclically linked, but rather, form part of less structured hominin itineraries. By the Middle Palaeolithic existing patterns of landscape-use can be seen as having intensified; such behaviours therefore have deep roots within existing hominin repertoires. Having identified such places, however, understanding their relative importance, and how such visits were scheduled in hominin lives, is more difficult. In order to reconstruct hominin itineraries and lived lives, it will be necessary to focus in on tight, regional studies of particular landscape catchments. At present, although we can broadly categorise different types of site and acknowledge behavioural complexity, we cannot animate these landscapes.

Chapter 11
Conclusion

11.1 Introduction

This thesis set out to re-evaluate earlier Palaeolithic archaeological assemblages from the Orontes and Euphrates Valleys and to assess what these datasets can contribute to our understanding of early human settlement history, technological decision making and landscape-use. As a body of data, they provide an impressive corpus of material to assess general trends, both at specific locales and the wider regions surrounding particular sites. Other material, such as that recovered from the "Living floor" site at Latamne (see chapter five, section 5.4), provides more spectacular, fine-grained evidence of hominin activity through which ethnographic scale behaviour can be accessed. Through detailed taphonomic and technological analysis of key collections it has demonstrated that the earlier Palaeolithic record from these regions provides insights into hominin technological practices and landscape-use which impact upon our understanding of early human behaviour both in the immediate area, and throughout the wider Near East.

Previous research into the earlier Palaeolithic of the Orontes and Euphrates Valleys has focussed on broad scale patterns of typo-technological variability exhibited by specific artefact categories in order to assess settlement history (Hours 1975; 1981; 1992, Copeland and Hours 1993, Muhesen 1981; 1985; 1993, Copeland 2004). The research presented here has placed key assemblages from these regions within their specific landscape settings, focussing on their taphonomic and technological attributes, using a flexible methodology. Such an approach demonstrates that these assemblages are the product of a complex interplay between taphonomy, material affordances and active hominin choices, and that these are all situationally specific. By exploring these influences, it has been possible to illuminate factors which are likely to have contributed to earlier Palaeolithic artefact variability, and to reconstruct how early humans were exploiting the landscapes in which they were active. The implications of this study for understanding hominin settlement history, technological decision-making in both the regions studied, and the significance of these results for the understanding of the early Palaeolithic record of the wider Near East, are summarised below.

11.2 Lower Palaeolithic settlement history and behaviour in the Orontes and Euphrates Valleys

The Euphrates Valley currently displays the earliest evidence of hominin activity of the two regions considered in this study. This research has confirmed a previously unrecognised human presence in this region by at least ~0.85 mya (Ain Abu Jemaa, Ain Tabous and Hamadine), and probably prior to ~1.0 mya (Maadan 1 and 5). This suggests that the Euphrates Valley was frequented by human populations at least 200 kya earlier than formerly thought (e.g. Besançon and Geyer 2003, 55). Furthermore, this study suggests that the lack of handaxes from some early assemblages in both the Euphrates and Orontes Valleys does not imply the presence of culturally distinct hominin groups, but rather, can be accounted for by the size of the assemblages available for study (e.g. Maadan 1 and 5) or situationally specific factors (e.g. Rastan).

The general importance of applying context orientated approaches to understanding artefact variability is demonstrated by all the Lower Palaeolithic assemblages considered in this thesis. Traditionally, it was thought that evolutionary trends in core working practices could be observed amongst Lower Palaeolithic assemblages from the Orontes and Euphrates Valleys, which were also reflected in handaxe form (see chapter ten, section 10.3). However, re-analysis demonstrates that such a contention is no longer tenable. Core working practices associated with all the Lower Palaeolithic sites presented here conform to the same simple approach to flaking, which proceeds organically, and is geared towards the production of medium-sized flakes. Particular variations between assemblages are largely explicable in terms of specific local affordances, and especially immediate raw material size and shape.

This study suggests that variations in handaxe form are a product of the volumetric properties of the blanks available and are not chronologically or culturally significant. Blank form influences the initial course of reduction, and affects the subsequent technological choices made (e.g. the use of a hard and/or a soft hammer). In addition, these technological choices themselves further influence the final form of a handaxe, but, rather than being culturally significant, these choices evolved "in hand" as the knappers engaged with the material. Consequently, this research suggests that nomenclature (e.g. Middle Acheulean) reflecting the supposed evolutionary status of Lower Palaeolithic artefact assemblages from the Orontes and Euphrates Valley should be abandoned, as such categories fail to reflect, and indeed arguably inhibit, attempts to understand genuine variability.

The analysis undertaken in this thesis has also enabled a clearer and a consistent picture to be gained of Lower Palaeolithic behaviour and landscape-use in the Orontes and Euphrates Valleys. Artefact production, maintenance and discard occurred at specific places in these landscapes where raw material was locally available, and such places were subject to repeated visits. Significantly, however, there is also evidence that these activities do not reflect the full gamut of hominin technological actions, as there is clear separation between places where specific technological practices were enacted. In particular, several of the assemblages studied (e.g. Latamne "Living floor" and Gharmachi 1) reflect the initial stages of artefact production being carried out away from the area investigated. Consequently, and for the first time, it has been possible to populate the Lower Palaeolithic of the Orontes and Euphrates with active hominins engaging with their landscapes.

11.3 Implications of study for Lower Palaeolithic settlement history and behaviour in the Near East

This research has confirmed hominin presence in the Euphrates Valley prior to 0.80 mya, an observation which significantly enhances the small corpus of artefact occurrences from the Near East securely dated to this period. Furthermore, these are the only assemblages dated to this interval identified outside Palestine/Israel; it is likely that further fieldwork will identify other assemblages of similar date in the Euphrates Valley and other major routeways through the Near East. As Dennell and Roebroeks (2005) have suggested, the current division between an East African Early Pleistocene core zone and its surrounding periphery may be more reflective of modern geopolitical boundaries and research traditions than a genuine reflection of earlier Pleistocene settlement histories. The existence of such an early hominin presence in the Euphrates Valley is particularly notable, as it strengthens the suggestion that the Arabian Peninsula may have formed an important linkage between what was traditionally regarded as the ancestral homeland of early humans in East Africa, and Eurasia.

In relation to these early sites, this study has shown that the apparent absence of handaxes is the result of either restricted collection size, or particular local constraints, and not a culturally or chronologically meaningful pattern. This conclusion impacts upon how early assemblages from the wider Near East are interpreted, and in particular, demonstrates the necessity of adopting a similar, contextualised approach to the analysis of other early Lower Palaeolithic assemblages from the region. The suggestion that the earliest hominins to occupy the Near East did not produce handaxes cannot be supported; they clearly could, and did (see chapter ten, section 10.2). Furthermore, this research challenges the widely held belief (e.g. Bar-Yosef 1994; 1998, Goren-Inbar and Saragusti 1996, Foley and Lahr 1997, Carbonell *et al.* 1999, Saragusti and Goren-Inbar 2001, Carbonell and Roderíguez 2006, Lycett and Von Cramon-Taubadel 2008) that artefacts can be used to posit cultural and/or biological links between geographically separate hominin populations. By following the contextually grounded approach advocated in this thesis, claims for long distance cultural links between geographically distant areas cannot be sustained (see chapter ten, section 10.2).

Just as this thesis challenges the use of artefacts as cultural markers between places, so it also questions the identification of culturally significant temporal trends. Abstract evolutionary logic of this sort underpins many current interpretations of Lower Palaeolithic artefact variability in the Near East. Examples from the study areas, as well as the wider region (see chapter ten, section 10.3), demonstrate that approaches that view artefact form as chronologically or culturally meaningful do not accurately characterise or account for Lower Palaeolithic artefact variability. In contrast, the approach advocated here contextualises such variation, and recognises that individual artefacts, knapping scatters and assemblages are the products of active hominin technological decision making, carried out at a specific point in time and space. This study therefore demonstrates the potential benefits of such an approach for the understanding of the nature of, and factors responsible for, technological variability across the region.

Re-examination of key Lower Palaeolithic assemblages from the Orontes and Euphrates Valleys has also enabled an assessment of Lower Palaeolithic behaviour and landuse practices. This area of research is under-investigated both in the Near East and, indeed, the Lower Palaeolithic of Africa and Eurasia as a whole. However, what little data exists is enhanced and strengthened by this study. Lower Palaeolithic hominins have been shown to be actively engaging in complex behavioural practices, involving repeated visits to favoured places. The technological practices which they undertook reflect spatial segregation of the *chaîne opératoire*, and material was transported throughout their landscapes, although the absolute distances involved do not appear excessive. By moving away from treatments of artefacts as static, cultural residues, we are now able to re-animate Lower Palaeolithic hominins, and move from the scatters they left to the landscapes through which they moved.

11.4 Middle Palaeolithic behaviour in the Orontes and Euphrates Valleys

This research has enabled a reassessment of Middle Palaeolithic technological decision making and behaviour in the Orontes and Euphrates Valleys. Nearly all the selected assemblages studied from this time period reflect a high degree of technological flexibility, combining three primary strategies: Levallois flaking, handaxe production, and a more *ad hoc* approach to core working. Most are systematically collected surface finds, and therefore represent behavioural palimpsests, reflective of Middle Palaeolithic activity over extended periods of time. In contrast, however, the two stratified collections studied (Latamne "Red colluvium" and Tahoun Semaan 1) reflect hominin activity during a more restricted period, and possibly even a single visit.

Taken together, the Middle Palaeolithic collections presented here demonstrate that technological variability can only be adequately considered through reference to specific landscape contexts. The composition of any given artefact assemblage clearly reflects the interplay of a number of different factors, including aspects of site function, intensity of artefact curation and degree of transport. Raw material size and form clearly also has an effect upon lithic artefact production; smaller nodules, by their very nature, cannot be as extensively reduced and rejuvenated as larger ones. This is especially apparent when one considers the assemblages studied which contain large numbers of simple prepared cores (e.g. Rhayat 2 and Chnine East 1). The raw material associated with these assemblages comprises small clasts, which do not allow for extensive preparation of a flaking surface. However, there is no simple, linear relationship between any of these factors and the technological strategies evident at any particular place; rather, this study has shown that it is necessary to look from each scatter to the wider landscape context, to understand how humans were living in, moving through, and perceiving such places (*cf.* Conneller 2007).

The relationship between different places within hominin landscapes is key to contextualising technological variability. Many of the sites analysed here are large collections from valley-side locations which are directly associated with a raw material source. The very fact that most are also surface collections - and therefore palimpsests reflective of repeated visits to these locations - allows one to look beyond the site to the wider hominin landscape, and thus to appreciate a long term, cyclical relationships between these specific places and their wider situation. Consequently, these assemblages predominantly reflect the actions of Middle Palaeolithic hominins engaging in artefact production and maintenance (e.g. Tahoun Semaan 2 and 3, Tulul Defai, Chnine East 1 and Chnine West 1); practices which could be termed "gearing up" activities. Particular assemblages appear to solely reflect such practices (e.g. Latamne "Red colluvium", Rhayat 2, Chnine East 1 and Chnine West 1), whilst others actually suggest a more complicated relationship between these places and the wider landscape, extensively curated pieces being discarded at them (e.g. Tahoun Semaan 2 and 3, Tulul Defai and Qara Yaaqoub). In addition, particular elements of assemblages appear to have been produced at some sites, but were subsequently removed, presumably to be utilised elsewhere in the surrounding landscape (Tahoun Semaan 2 and 3, Tulul Defai and Latamne "Red colluvium"). Indeed, this study has identified one site (Tahoun Semaan 1) where no proximate raw material was available, and where curated pieces were discarded in small numbers. Given this immense variety in the types of technological act undertaken by hominins throughout their landscapes, it is unsurprising that the technology evident at them is varied.

This work additionally demonstrates that particular approaches to lithic reduction are also situationally specific, an observation that is especially apparent when one considers the particular preparatory and exploitation methods adopted during Levallois flaking. It has been demonstrated here that such approaches are knowledgeably modified to acquire endproducts with particular functional, morphometric properties; the manner in which this was done varies both in response to available raw material and the complex patterns of landscape-use outlined above. Thus, at sites where extremely exhausted, extensively curated Levallois cores are encountered, particular technological approaches were adopted to prolong the productive life of these cores (e.g. Tulul Defai and Tahoun Semaan 1, 2 and 3), especially a final phase of centripetal convexity rejuvenation on cores that had previously been exploited and prepared in another manner. Furthermore, such sites frequently also produce large numbers of discoidal cores (e.g. Tulul Defai), perhaps suggesting that recurrent exploitation of Levallois cores may sometimes result in them becoming volumetrically discoidal.

Taken together, these assemblages underline the fact the divisions proposed between different Levallois modalities (*cf.* Boëda 1986; 1995) - and even different core working techniques - are largely analytical, and that they cannot be accepted on face value as conceptually-bounded, shared cultural templates for lithic reduction. Rather, hominins modified the techniques they applied to the material - and the state of the material - that they were dealing with, in different ways, at different times. Such observations can only be appreciated through a contextually aware, active re-animation of the lithic residues of technological practice.

11.5 Implications of study for Middle Palaeolithic behaviour in the Near East

The significance of the conclusions drawn by this study regarding Middle Palaeolithic technological variability clearly extend beyond the confines of the Orontes and Euphrates Valleys. The range of technological variability that this thesis documents contributes to an emergent picture of Near Eastern Middle Palaeolithic artefact assemblages that encompasses many more technological options than previously thought (see chapter 10, section 10.5). Furthermore, this study makes it clear that if we are to gain a more complete understanding of the nature of, and factors responsible for, Middle Palaeolithic technological variability, analysis needs to extend beyond traditional attempts to establish which chrono-cultural unit of the Tabun sequence other assemblages are most akin too. The assemblages analysed here, as well as those from the wider Near East, demonstrate that Middle Palaeolithic technological variability, and any genuine chronological trends within it, can only be comprehensively documented through a technological approach routed in the specific context of assemblages.

In addition, this research has provided new insights into specific technological issues which are critical to the study of similar assemblages from across the region. In particular these results suggest that, although recent approaches to the study of variability evident in Levallois flaking in the Near East have greatly enhanced our understanding of what variability is apparent, it has also limited research into the factors which underlie it by imposing a static framework upon a dynamic process (see chapter ten, section 10.6). In order to re-animate the study of Levallois variability in the region, it is suggested here that a contextualised approach is required, enabling the specific factors that may have influenced variability at a local level to be appreciated. This study suggests that particular approaches to Levallois flaking reflect responses to specific volumetric constraints and objectives at individual points in time and space. They are not, as is often suggested, reflective of abstract, culturally transmitted, mental templates.

The analyses of Levallois material within the sites presented here form a significant contribution to the growing corpus of material which suggests that its emergence in the Near East can be traced in the local, Lower Palaeolithic technological repertoire. This is exemplified by the sporadic appearance of simple prepared cores, reflecting the flaking of the surface of a nodule, amongst Lower Palaeolithic assemblages from the region (e.g. Ain Abu Jemaa and Jrabiyat 2). In combination with other evidence from the Near East, these examples demonstrate that assumptions underlying studies tracking human dispersals out of Africa through the first appearance of Levallois flaking are fundamentally flawed.

The picture that emerges from this study shows Middle Palaeolithic hominins engaged in dynamic and complex practices, a fact which is increasingly widely acknowledged within broader Middle Palaeolithic research. However, few studies have previously engaged with hominin technological behaviour and landscape-use, as reflected by lithic artefacts, especially within this region. Moving away from the static classifications of lithic inventories as chrono-cultural entities releases both hominins, and the individuals who study them, from a behavioural straitjacket. It is becoming clear that a myriad of factors impact upon the actions undertaken by specific hominins, at specific places, and at specific points in time; the interrogation of such factors requires a more nuanced approach to lithic variability than has previously been favoured. In order to understand how hominins lived their lives, we actually have to replace them within their landscapes.

11.6 Directions for future research

When viewed in respect of the immense period of time and the number of human generations the earlier Palaeolithic record of Syria encompasses, we currently possess only the coarsest view of the behavioural repertoire associated with the people active in this region during this period. Consequently, although this study has provided a significant contribution to our understanding of early human technology and behaviour in the region, it inevitably leaves us with more questions than answers. Importantly, however, as it involves applying new methodological and theoretical perspectives, this thesis also suggests potential research trajectories to follow in the future.

In terms of the Lower Palaeolithic, a key priority for future research in Syria and the wider Near East is to expand the small corpus of sites from the region attributed to the period prior to 0.80 mya. This will allow a much firmer understanding of the technological repertoires associated with these early occupations and an assessment of whether the region was subject to sporadic, or permanent settlement during this period. Furthermore, following the approaches adopted in this study, reassessment of Lower Palaeolithic assemblages from across the Near East is required to assess the behavioural and/or cultural factors which potentially underlie Lower Palaeolithic technological variability. Refitting studies of minimally disturbed lithic scatters (such as those present at 'Ubeidiya and Latamne) would considerably enhance understanding of these practices, as would a greater number of chronology constrained assemblages. The recovery of more data relating to the climatic and environmental conditions associated with Lower Palaeolithic occupation in the Near East is also a priority, as this will enable the reconstruction of the environments in which hominins were operating, as well as those they avoided. Adding flesh to the existing bones of the Near Eastern Palaeolithic record in this way would enable assessment of hominin practices beyond lithic-working and discard.

Similarly, a clear priority for future research into the Middle Palaeolithic record of the region is a reassessment of technological variability, particularly during the early part of this period, within which enormous variation is increasingly apparent. Accurate characterisation of this technological variability amongst early Middle Palaeolithic assemblages - currently classed as Amudian, Yabrudian and Acheulo-Yabrudian - is of paramount importance, as is refining the environmental and chronostratigraphic contexts within which such assemblages are located. By adopting the methodology developed through this study, it will be possible to assess what factors underlie this emergent variability. Expanding these studies into the latter part of the Middle Palaeolithic will permit the eventual and lasting dominance of Levallois flaking – expressed in a myriad ways – to be investigated. As an adjunct to this concentration on further lithic analyses, it is imperative that new field studies are undertaken to locate and sample environmentally productive sediments. Lithic debris only reflects a single facet of hominin lifeways; a true understanding of whole context entails further work to accurately characterise and understand the structure of the landscapes within which they were active. In the same way, new analyses of faunal remains - including those held within existing collections - may illuminate hominin interactions with other species, casting light upon wider activities and adaptations.

This research has demonstrated that the earlier Palaeolithic record reflects dynamic hominin engagements with the material world. Consequently, future studies of the Lower and Middle Palaeolithic of Syria and the wider Near East must be rooted in the specific context of the sites, assemblages and occupation debris under consideration, and recognize the fact that they are the product of behaviourally flexible groups and individuals. In particular, the challenge for the future should be to build upon emergent generalised pictures of earlier Palaeolithic behavioural practices, reconstructing lived hominin lives through studies of particular landscape catchments. Only then will we begin to appreciate the full complexity of the life and times of our predecessors.

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